Gas Journal

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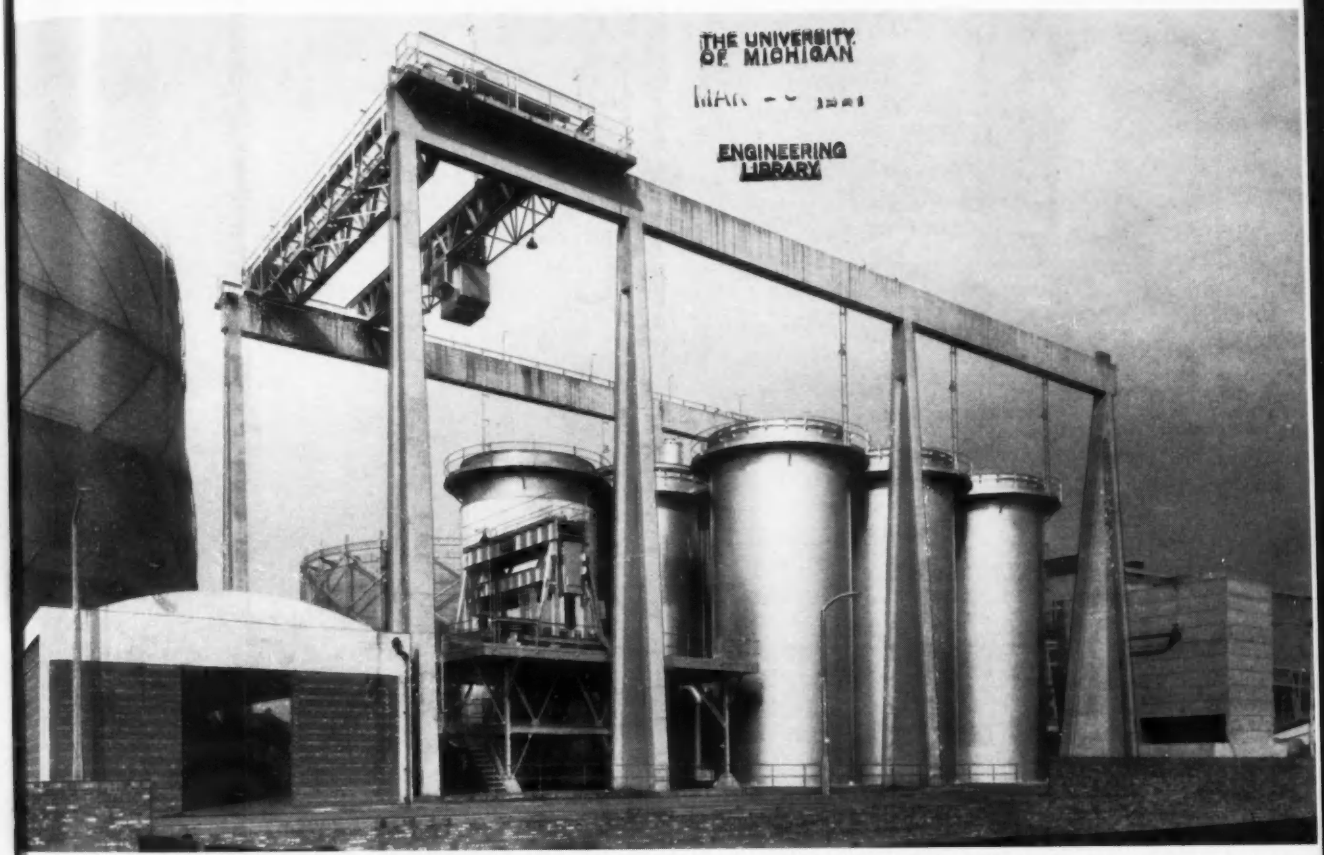

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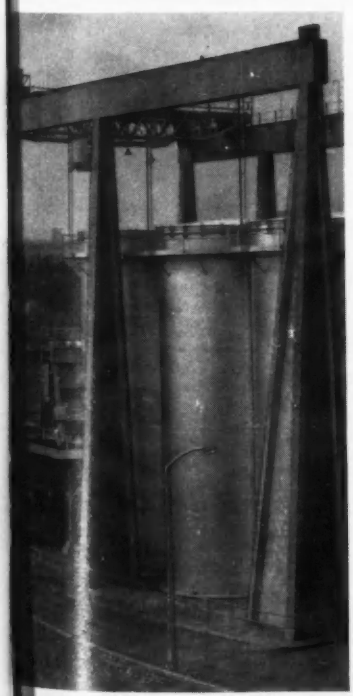

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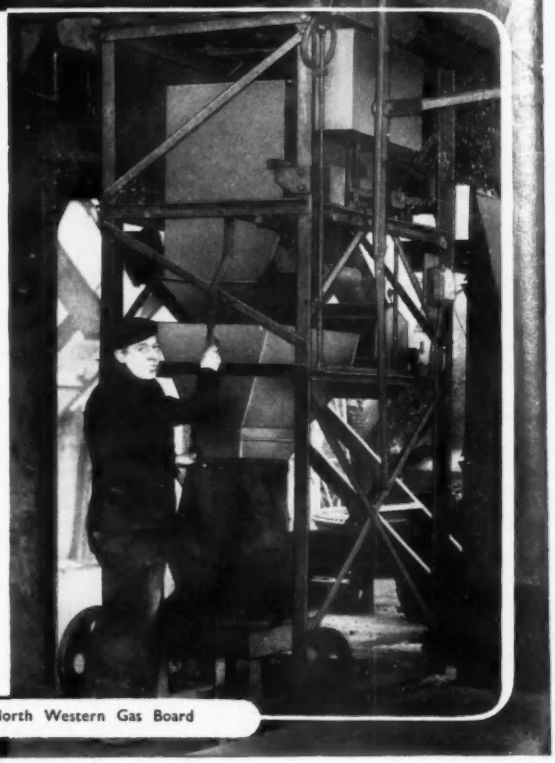

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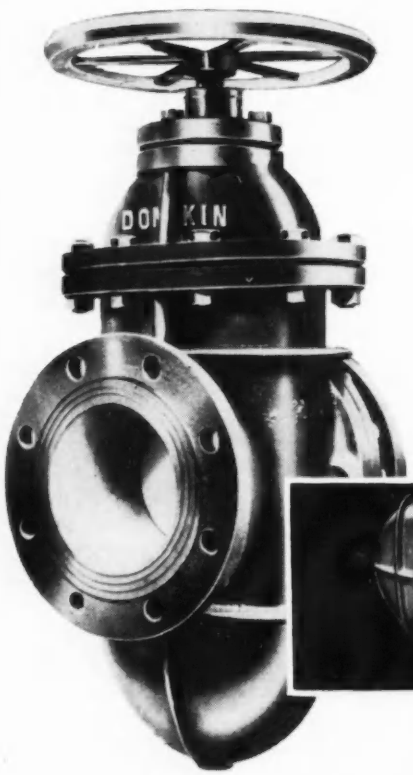

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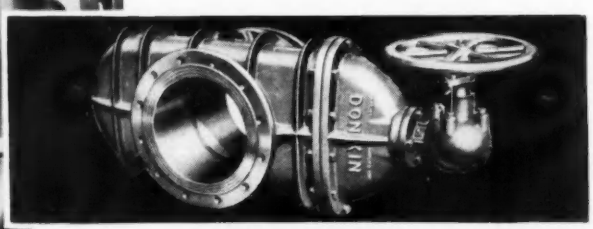

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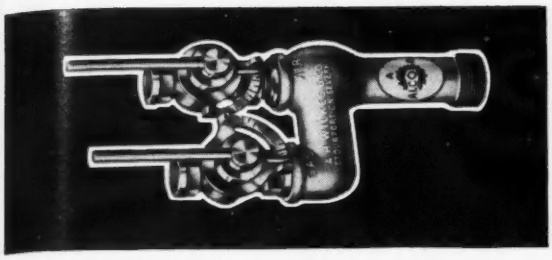

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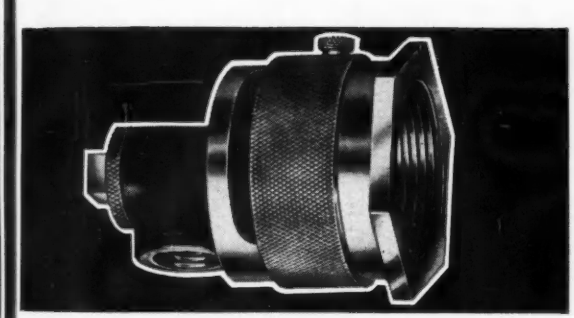

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Gas Journal

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WEDNESDAY, FEBRUARY 15, 1961

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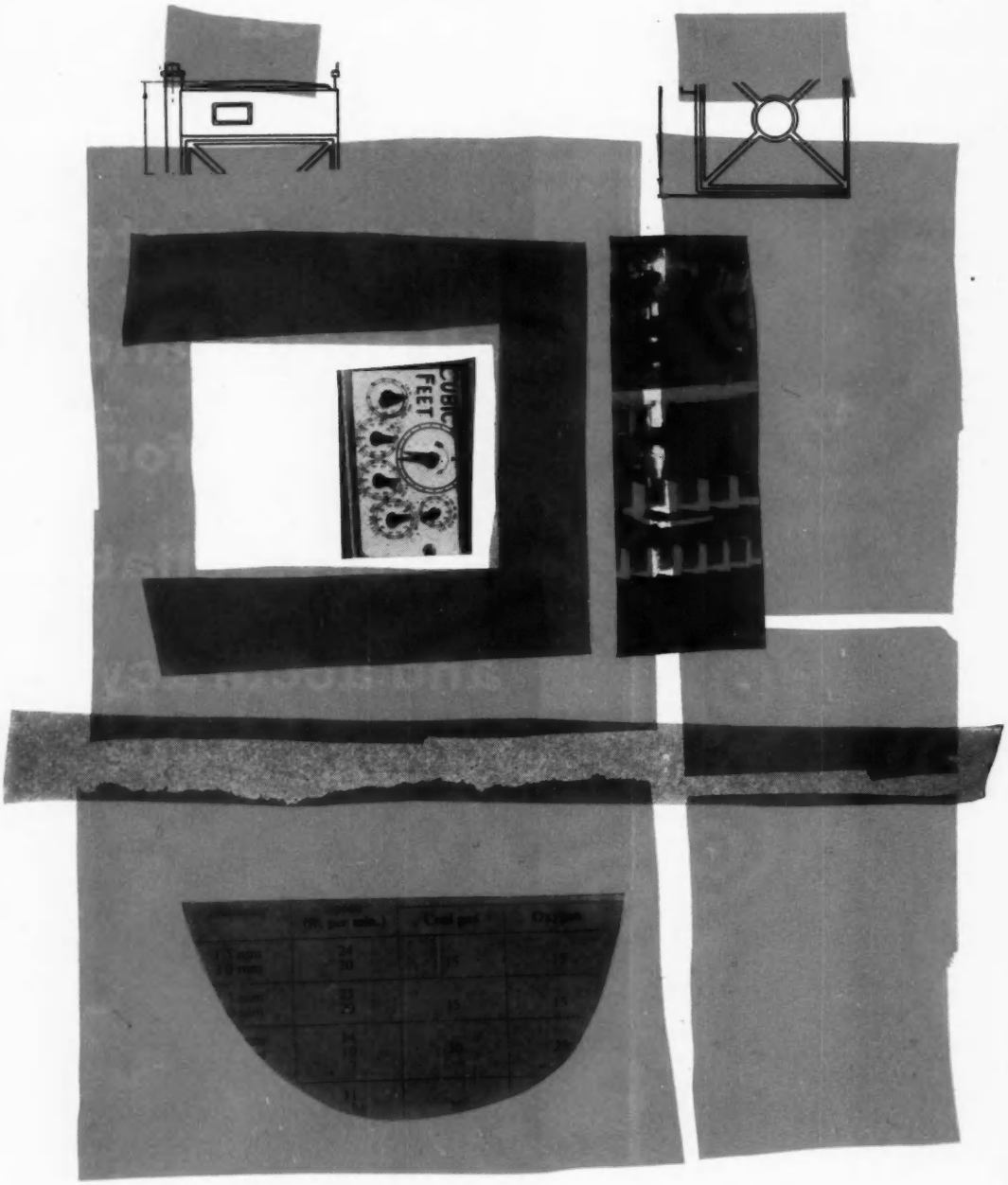

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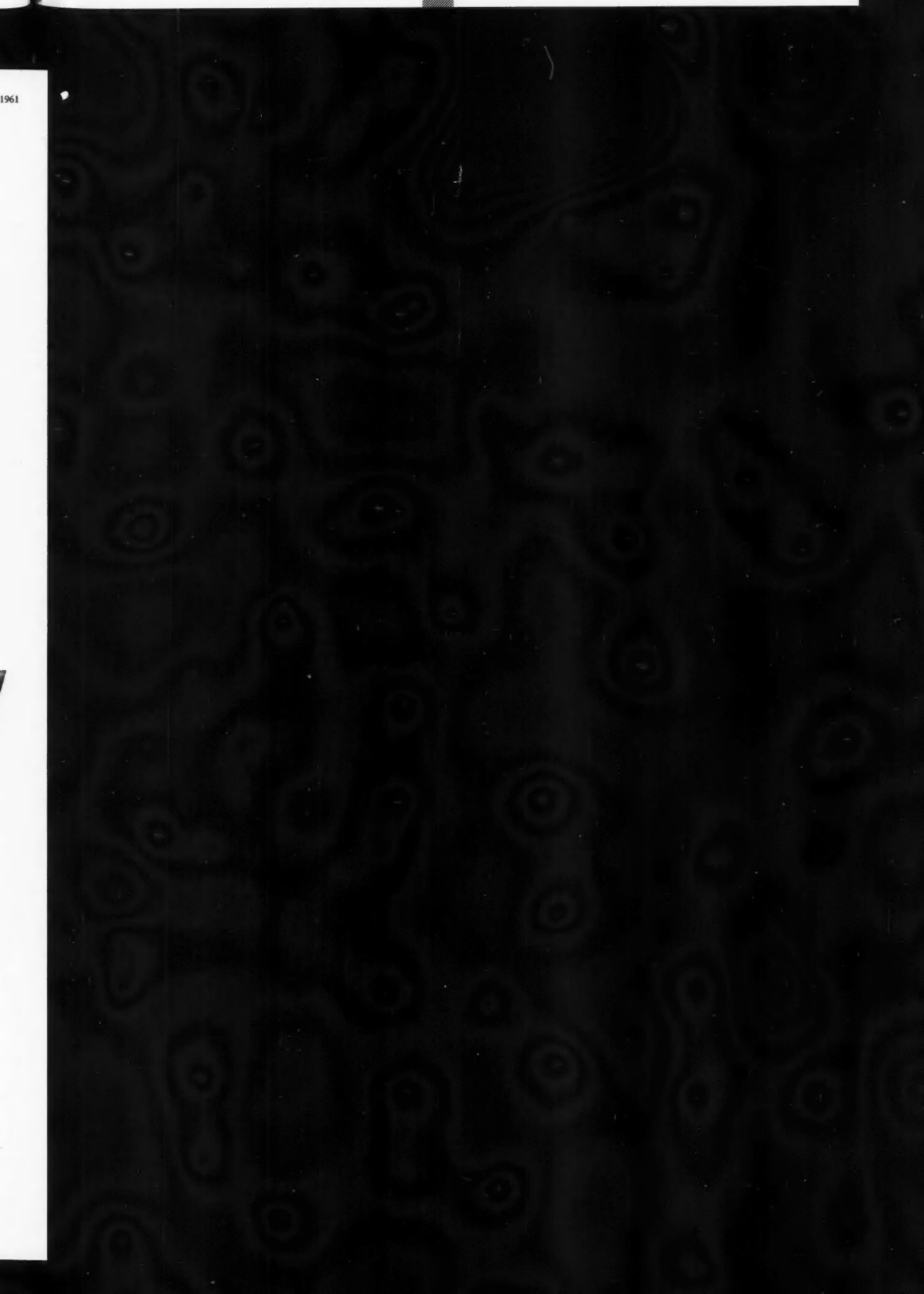

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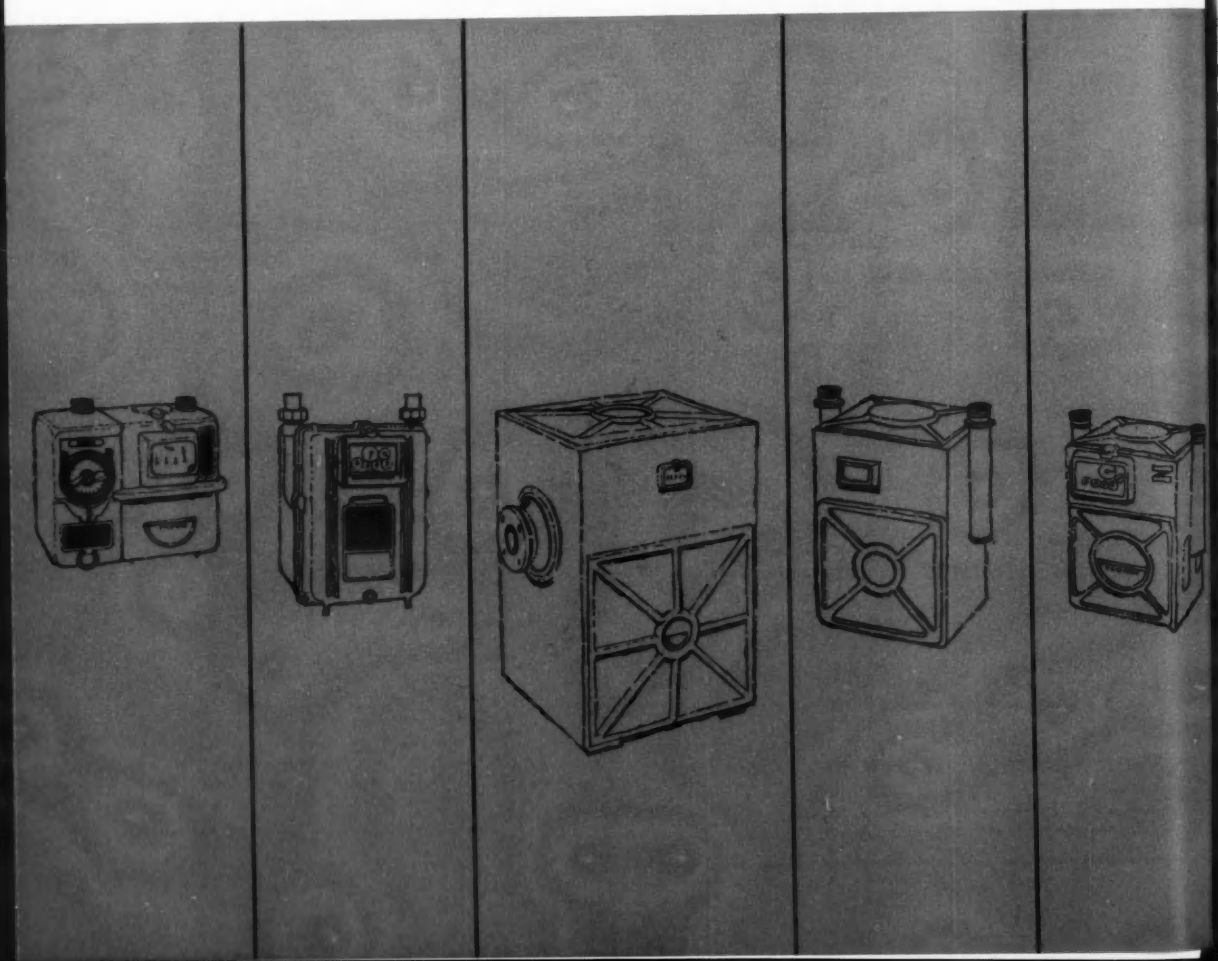

Gas Journal

COKE OVENS • BY-PRODUCTS • CHEMICALS

Vive le Gaz de France

THIS week we are publishing a paper by M. Roger Odier, Le Chef de Service of the Direction des Services Economiques et Commerciaux of Gaz de France, which describes in some detail the quite staggering developments that have taken place in the French gas industry in the last few years.

Nationalisation and the formation of Gaz de France took place in April, 1946, more than three years before vesting day in Great Britain. That it should have taken place so soon after the end of the second world war is significant, since it helps to convey how badly the industry in France must have suffered during the hostilities, and for the nationalised body to have become effective within a year of the cessation of the war in Europe probably prevented the industry from going out of existence altogether.

But even so it is remarkable that so little development was possible until the discovery of natural gas in South Western France in 1951. This discovery gave the incentive, the momentum of which appears to have carried the French industry forward to undertaking some truly stupendous tasks, both in the treatment of the natural gas and its transportation.

The results have had the effect of reviving the industry and of changing the whole fuel and power position throughout France.

We have on more than one occasion stressed the fact that Britain has in the past been more gas-minded than much of the Continent of Europe, and we have put this down to our resources of coal and our pioneering spirit over the last century or so. Reference to statistics published in this country for the year 1959 shows that there was a total of 12.924 mill. consumers in Britain who took 2,551 mill. therms. Provisional figures quoted by M. Odier for 1960, show that there were 5.54 mill. domestic consumers in France, compared with 12.178 in Britain in 1959, and the total consumption of gas in France in 1960 was 676.5 mill. therms.

France, however, is a larger country than Britain, with a slightly smaller population. The fact that the number of undertakings absorbed by Gaz de France was only 91, whereas more than 1,000 were nationalised in Britain in 1949 should, we think, be borne in mind when the possibilities of expanding the industry in either country is being considered.

This, however, does not in any way detract from the very fine achievement by Gaz de France after natural gas became available, since figures quoted in the paper show that the number of domestic consumers rose between 1947 and 1960 by 23% and the sales of gas by 82%. Prospects for 1965 show further increases of 11% in the number of domestic consumers and some 37% in total gas sales over the 1960 figures.

Another fact which emerges from this paper is that the French gas industry may abandon carbonisation as a means of gasmaking in the foreseeable future.

It appears that within the next five years the only carbonising plants to be operated by Gaz de France will be its coke ovens in Rouen, Paris and Strasburg. To this quantity of manufactured gas must be added the coke oven gas now being brought from the iron and steel works in Lorraine. We understand that when these three carbonising plants become obsolete, they will not be rebuilt.

What then will Gaz de France use as its means of gas production? From the paper we gather that natural gas, l.p.g., and oil products will be used exclusively, the choice of which will depend on the accessibility of any given supply area to a particular source. To us in Britain such a radical change is almost unbelievable and quite outside realisation; the effect on our kindred fuel industries might be almost ruinous. The French coal industry, however, is very much less dependent on the gas industry than it is in this country, since coal imports have been quite common for certain industries in the past. It must be realised too that the output from the French mines is only some 50 mill. tons a year, about 25% of that from the British mining industry.

Our reaction to these facts is that we envy Gaz de France in that it can go forward in working out its future policies unshackled by traditional gas-making processes and unaffected by the claims of its coal industry to participate in the supply of the basic raw material. We must remember, however, that the dis-

coveries of an important oil field in Algeria and the vast gas deposits at Hassi-R'Mel, south of Algiers, considerably alters the oil supply position for France. In spite of political difficulties in North Africa this source of supply is not only being developed very fast but is within piping distance of Europe, and independent of the oil interests in the Middle East.

Gaz de France should, therefore, be able to build a completely modern industry on the foundations of the old, using the most up-to-date plant and the most easily handled raw materials. The supply of these raw materials appears to be outside the control of Gaz de France since even the production and treatment of the natural gas from the important deposit at Lacq is controlled by S.N.P.A., a nationalised oil undertaking in South Western France.

The building of the pipeline from the Pyrenees to Nantes in Western France, and on to Paris, and a branch from Angoulême to Lyons was illustrated in a colour film which M. Odier showed at the end of his paper. The very great obstacles to be overcome in the laying of this pipeline were immediately apparent.

A section of the Forest of Larnes, near Bordeaux, through which the 24-in. main passes, was shown and this gave some idea of how comparatively thinly populated certain parts of France are. So also does the fact that 40% of all gas sold by Gaz de France is consumed in Paris.

Other scenes from the film stressed the very exacting work needed in taking these large pipelines across rivers of considerable width. Such operations, using well tested techniques and modern machinery which are now becoming almost commonplace in Europe, illustrate the enormous advances almost forced upon the gas industries of Europe by new discoveries and hard economics, but we feel certain that the European tradition of sound workmanship and attention to detail will not be affected by such changes.

Clearly natural gas and oil gasification processes, including the production of propane and the supply of propane-air, are going to be the key to the new gas industry in France. That Gaz de France has been able to take advantage of these new materials in both lands and develop them as fully as possible demands our complete admiration.

Clearly with such future prospects on the horizon as an additional supply of natural gas from Algeria which may well supply the greater part of Western Europe there is the most thrilling, yet exacting, future for everyone employed by Gaz de France.

The song, not the singer

LAST month we wrote about 'Improving the Image' and suggested that the projection of a new and desirable image for gas could only be undertaken successfully by the combined efforts of people in all departments of sales and service; it was not, we said, merely the prerogative of specialists in advertising and publicity. Nevertheless it is to the publicists that the strongest weapon has been given—the ability to bring their ideas to the public virtually overnight.

Since nationalisation there has been a complete revolution in gas advertising, and the resulting improvement has shown a marked acceleration during the past two years. One reason for this may be the national co-ordination of campaigns which has had the effect of ensuring that all boards concentrated on selling the same thing at the same time, producing advertisements which tied in with the efforts of the Gas Council.

In our view, however, there is more to it than that. Despite the fact that publicity officers from the various boards meet regularly there has never been much evidence of interchange of ideas. Perhaps this is heresy, but we have always discerned a certain rugged individualism among the gentlemen concerned. We may be wrong but we suspect that the climate of gas selling, the pattern and quality of competitive advertising, and the employment of first-class advertising agents have combined to produce a crop of advertisements which, though reflecting the character of the various boards, have in common a strong similarity of style and a very high standard indeed.

We thought it might be interesting to try and prove our point and so we set about collecting examples of recent advertisements and promotional literature produced by various gas boards. The result was even more impressive than we had anticipated.

The signs of the new gas image were unmistakable. They were discernible in some beautiful Scottish Gas Board layouts, in certain Southern Gas Board ads., in the North Thames series to which we referred in these columns recently, and elsewhere besides. And, more surprisingly perhaps, there was a clearly defined acceptance of humour as a useful tool in attracting the public's attention and making a sales point. Interesting points included the continuity of theme in East Midlands advertising (always the same young couple and catch phrase 'Go Gas Now'), the stress laid on the 'community centre' load in Northern literature, and the high standard of typography and production in almost all the brochures and leaflets we studied. Central heating literature was almost uniformly good and there were some very fetching booklets on room heaters, some in full colour. Mention of colour reminds us of the first-class four-colour central heating advertisement produced by the North Eastern Gas Board—a type of presentation worthy of national coverage—and the same Board's four-colour industrial ad. which is equally impressive.

More and more, it seems, the emphasis is placed not on the fuel but on the service it provides—The Song Not the Singer, to misquote a current film title. A marked exception is the controversial series of North Thames ads. which make much play of the phrase 'gas for fuel.'

A selection of gas board advertisements and literature appears as a special 12-page section of *Gas Service* this month.

From a paper to the District Sections of the I.G.E.

Current developments in the French gas industry

By M. ROGER ODIER,

LE CHEF DE SERVICE,
DIRECTION DES SERVICES ECONOMIQUES ET COMMERCIAUX,
GAZ DE FRANCE.

ON vesting day—April 6, 1946—the French gas industry, which had remained very steady between 1920 and 1939, was in a poor way, and many people considered it as definitely obsolete. War damage, increasing operational costs and tariff-cutting badly hampered the progress of its sales and any improvement of its financial balance-sheet.

At that time, there were 591 private gas undertakings distributing mostly coal gas, produced in either isolated gasworks or in some cases linked by restricted transportation networks.

At the end of 1960, there were about the same number of local distribution systems, but there had been a huge development of bulk transportation lines and a considerable number of gasworks had been closed down. They had been replaced by propane or propane-air stations, or by cracking plants using petroleum products as feedstock—l.p.g., light distillates, or refinery gases.

Table I shows this transformation in detail and these developments will undoubtedly continue in the coming years as fast as our modernisation programme goes into operation.

TABLE 1

Number of Undertakings	1947	Dec. 31, 1960
Conventional gas-works	458	150
Coke oven gas supplied through a transportation network	123	150
Reformed natural gas	—	3
Straight natural gas	3	86
Cracked gas produced from liquid hydrocarbons, propane or refinery gas	—	32
Propane—air	—	106
Straight propane	7	66
Total	591	593
Length of transportation network	1,450 miles	6,500 miles

In about two years' time, probably the only coal being carbonised will be in the coke oven plants located near Paris, Rouen and Strasburg; all the other distribution systems will have been linked to a transportation line of coke-oven or natural gas, or converted to use liquid or gaseous hydrocarbons as feedstock.

Table I shows the complete transformation of production techniques that has taken place in France in the last few years. If this leads to a lessening in the activities of Gaz de France as a producer, its national transporter service activities will have increased considerably and its part from now on will consist more and more in collecting gas of all kinds wherever it is available and transporting it to the consumer, often far away from the place where it is produced.

TABLE 2
Sales development in France

Gas sales	1947	1960 Provisional figures	Ratio: 1960/1947	1965 Prospects
GAZ de FRANCE				
Domestic Consumers mill.	4·481	5·54	1·23	6·15
Sales, Mill. Therms :				
Domestic uses	266	407	1·53	534
Commercial uses	36	89·5	2·5	145
Industrial uses	47·5	160	3·4	224
Various	22·2	20	·9	25
Total	371·7	676·5	1·82	928
Sales of natural gas and oil products from S.N.P.A. and G.S.O.—CeFem. (Subsidiary Companies of Gaz de France and S.N.P.A.)				
Industry	21	423	37·5	730
Electricité de France	—	363 } 786		570 } 1,300

Table 2 shows the progress in gas sales over the same period, but the figures do not include the gas supplied by coking plants of the mining and iron and steel industries to their workshops or for chemical synthesis which at present amounts to some 330 mill. therms. From 1965 onwards development prospects will depend essentially on the resources of natural gas which can be put on the market.

On these bases Table 3 shows the proportion, given as percentages, of gas consumed in the different sectors. Gas to blast furnaces and electrical power stations have been excluded.

TABLE 3
The Part of Gas in Power Consumption in France

Consumption sector	1947 %	1960 %	1965 (expected) %
Domestic and commercial uses	7	7	8
Industrial uses excluding electricity production and gas to blast-furnaces	4	13	17

In actual fact, in the areas supplied by natural gas, gas covers already 25% to 30% of the power consumed in the industrial sector and even more than 60% in the region of the South West. Until now this particular part of the country has not been widely industrialised; the chemical

industry is responsible for the very high consumption there at present.

Just before the second world war, two small deposits of natural gas, of purely local importance, were worked in the Jura and supplied Lons-le-Saunier and Amberieu; on July 14, 1939, the deposit in Saint-Marcet, Haute-Garonne, was discovered. The reserves of this deposit, situated about 4,000 ft. deep were of the order of 230,000 mill. cu.ft. Delayed by the war, the development of this deposit did not really start until 1947. At first, Toulouse and Pau were supplied; later Bordeaux, which was reached in 1952. This deposit, which supplied an extremely pure gas, with no trace of sulphur, is actually more than half exhausted—it can, however, still supply about 30 mill. cu.ft. a day.

St. Marcet belongs to the hydraulic type of deposit and the pressure at the well-head is of the order of 1,500 p.s.i. The gas is stripped from its gasolene at Boussens. As such, the Saint Marcet deposit had only a regional importance limited to supplying the South-West of France.

Petroleum deposit

In 1949, the S.N.P.A. discovered a deposit of petroleum, of small importance in Lacq, situated at a depth of about 2,000 ft. This deposit, in 1960, supplied approximately 90,000 tons of crude oil, fairly highly charged with sulphur. Continuing its prospecting at a greater depth, the S.N.P.A., in December 1951, struck at about 11,000 ft. an accumulation of gas which from the very beginning has unfortunately showed itself to be very difficult to cope with.

The Lacq gas contains approximately 15% sulphuretted hydrogen as well as 10% carbon dioxide; pressure in the structure is of the order of 10,000 p.s.i. and the temperature 300°F. The sum of these characteristics constituted a far from enviable world record of the difficulties to be solved before the deposit could operate commercially.

Acid gas acts on the stressed metal of the tubing in such a way that the steel breaks into pieces, and thus an eruption occurred when the first well was bored. This was dealt with but, before this field could be further exploited, a steel and joints capable of resisting the acid and pressure from the gas had to be found. It was not until 1955 that such a steel was produced.

From then onward exploitation of the deposit became a possibility, so the S.N.P.A. began to build the purifying plant in 1956, the first part of which started processing gas at the end of April, 1957.

Crude gas extraction

From January, 1958, to September, 1961, crude gas extraction has increased from 35 mill. cu.ft. per day, to 700 mill. cu.ft. per day corresponding to 23 mill., and 460 mill. cu.ft. respectively of purified pipe-line gas per day.

From now on, the Lacq deposit will deliver an annual supply of 230,000 mill. cu.ft. of crude gas, giving after treatment: 150,000 mill. cu.ft. of pipe-line gas, 1.200 to 1.300 mill. tons of sulphur, 200,000 tons of high octane petrol, 80,000 tons of propane and 80,000 tons of butane.

The recoverable reserves from Lacq are at present estimated at approximately 7.5 billion cu.ft.; its exploitation may then go on for 30 years at the rate indicated above.

The dividing out of natural gas supplies among the different consumers will be approximately as follows:

Electricité de France 150 mill. cu.ft. per day or 30.5%.

Public distribution 130 mill. cu.ft. per day or 26.5%.

Manufacturing industries 210 mill. cu.ft. per day or 43%.

Total, 490 mill. cu.ft. per day, of which 460 mill. cu.ft. per day will come from Lacq and 30 mill. cu.ft. from Saint-Marcet.

How is the Lacq gas extracted and treated? The composition of the crude gas is shown in Table 4.

TABLE 4
Composition of Lacq gas

Constituent	
Methane	69
Ethane	2
Propane	
Butane	
Higher hydrocarbons	
Sulphuretted hydrogen	15
Carbon dioxide	9
Mercaptans	
Carbon oxysulphide	
Water	
	100.0

Owing to the pressure drop in the tubing, the gas at the well head arrives at a pressure of 6,500 to 7,000 p.s.i. according to the output and at a temperature of 180 to 200°F. It is expanded at this point to 1,400 to 1,500 p.s.i.; this also requires reheating and an injection of glycol so as to avoid the formation of hydrates in the collector network. At this point about 75% moisture is eliminated.

The gas arrives at the processing plant at a pressure of the order of 1,150 p.s.i. and at a temperature of 60 to 70°F. It passes first to a liquid separator on which baffle plates strip it of the water and the liquid hydrocarbons; the crude gas then passes on to the desulphurisation plant. Here a double washing is effected first with water, then with mono or diethanolamine, and so on in series.

In a main column, gas is washed with water at 1,050 p.s.i., which reduces the H_2S—CO_2 content from 25% to from 10 to 12%; the amount of COS present also falls to a low level.

Power recuperator

The washing water passes into a power recuperator where it is expanded to 140 p.s.i., thus liberating gases rich in CH_4, CO_2 and H_2S. This latter gas is washed in a second column to recover the H_2S; the washing water is stripped of the H_2S and the CO_2 in a third vessel, and separated by introducing deoxygenated flue-gases. The freed gases are then directed towards the sulphur plant and the water obtained from the bottom of the tower, containing only small quantities of dissolved gas, is recycled to the first main column.

The second stage washing is by diethanolamine at 1,000 p.s.i. in a contact column, and finally by soda which eliminates the last traces of sulphuretted compounds. The amine is regenerated in a column working at 20 p.s.i. and 270-280°F, and the acid gases are sent to the sulphur plant.

A section of the processing plant purifies crude gas directly with diethanolamine without a previous water washing; the last wash in soda is then more rigorous.

The purified gas is dried and cooled in propane evaporators at 40° F, and ethane evaporators at −100° F. Its temperature is reduced to about −100° F and the pressure lowered from 1,000 to 650 p.s.i. by direct expansion. The fluid then separates into two phases. The gaseous phase which constitutes pipe-line gas passes to the distribution network after recompression to about 1,000 p.s.i., and the liquid phase made up of a mixture of ethane, propane, butane and petrol.

These products can be separated by fractional distillation, and the ethane so obtained in fairly considerable quantities is utilised in ethylene production.

To recover the sulphur from sulphuretted hydrogen, part of the gas is first burnt in a steam generator to get SO_2, which then reacts with the remainder at 430 to 450° F

over a bauxite catalyst to form elementary sulphur according to the reaction:

$$SO_2 + H_2S \longrightarrow 3S + 2\,H_2O$$

The sulphur so obtained in the form of vapour is condensed and passes to the liquid sulphur pits. Sulphur recovery is between 96 and 97%.

Additional plant at Lacq includes: A boiler plant raising 670,000 lb. of steam per hour at 950 p.s.i.g., a 1,500-kW thermal generating station, water pumping and compressed air plant, a conventional propane storage of 175,000 gal. and a refrigerated storage of 900,000 gal., an l.p.g. bottling section and a 5.5 mill. gal. storage for petrol. The cost of this processing plant was about 60,000 mill. old francs.

Permanent control

There is a staff of between 1,200 and 1,300, one half of them working three eight-hour shifts, the other half a normal day. The aggressiveness of the crude gas—15% H_2S—10% CO_2—and the high well head pressure—7,500 p.s.i.—make permanent control of the plant and the collecting network absolutely essential.

To guarantee full production and an output of 700 mill. cu.ft. per day, it will be necessary to draw from 30 to 40 wells which may sometimes be as far as 9 km. away from Lacq. A centralised radio control has been set up which investigates all the wells in approximately one minute.

Checks are made on the following seven points: (a) The smooth functioning of radio equipment, (b) the position of the first main valve, (c) the pressure in the annular space, (d) the pressure at the head of the well, (e) the position of the high-low—shut-off valve, which protects the low pressure part of the plant, (f) the initial temperature of gas in the collector, and (g) the gas pressure at the same point.

In the control room a map shows the wells marked by a green signal changing to red in case of abnormal conditions. From here too the above parameters for each well are controlled, a lamp starting to flash in the event of faulty working. Transmission is carried out in frequency modulation on the 70 to 80-mc/s bands.

The transmitter's signal in code on the frequencies characteristic of each pit causes the 'pit' equipment to change over to transmission, while that of the central station goes over to receiving. The 'well' transmitter then transmits information following on a programme synchronised with the central station's equipment which switches the information on to the various detectors and signals. In this way, control is in fact continuous.

Automatic safety valves

The gas collecting network is protected at approximately every two km., and at special points such as road or river crossings, by automatic safety valves and non-return flaps.

At railway crossings on highroads, the gas mains go through gas-tight tubes, filled with nitrogen and equipped with a bursting plate fitted to a ring.

The closing of the automatic valve or raising the nitrogen pressure in one of these tubes is carried out by an impulse transmitted by cable to the radio cabin at the pit which is nearest to it; it is controlled at the same time as the elements at the well.

The diameters of the main arteries which make up the Lacq system are:

Lacq to Roussines	24 in.	welded and expanded sheet-iron pipe, welded lengthwise.
Roussines to Paris	20 in.	
Roussines to Vindecy	18 in.	
Vindecy to Lyon-le-Peage	16 in., 12 and 8 in.	extruded steel pipe.
Vindecy to Champvans	10 in. and 8 in.	
Chazelles to Nantes	10 in.	

The main branches are generally of 6 in. or 4 in. diameter.

Tests are carried out on all pipes under hydraulic pressure at the works at 1,070 p.s.i. for 12-in. diameter and above, and at 1,300 p.s.i. for 10-in. and below, equivalent to 150% service pressure.

Before being put into service, the gas pipes are tested under hydraulic pressure 10% higher than service pressure—1,100 p.s.i.—and are subjected to a test to assure them being gastight; this lasts ten days at a minimum pressure of 100 p.s.i.

The pipes have an outer covering of glass wool coated with coal-tar or bitumen of a minimum thickness of $\frac{1}{8}$ in.; they are coated inside with a layer of Inipol. A test for 'holidays' is carried out at 10,000 volts with an electric brush.

There is a depth of 3 to 4 ft. of soil above the main when laid.

Table 5 gives details of the boosting stations.

TABLE 5

Station	Distance from Lacq to the station, miles	Distance between station, miles	Maximum throughput mill. cu. ft. per day	Rate of compression	Capacity installed b.h.p.	Number and type
Auros	54	—	320	1·61	10,000	5 3-cyl.
Chazelles	143	89	320	1·61	10,000	5 4-cyl.
Roussines	223	80	280	1·34	6,000	3 4-cyl.
Vindecy	360	137	150	1·33	3,300	3 2-cyl.

The compressors are of the 'right angle' reciprocating type, the cylinder motors being supercharged by turbo-blowers fitted on to the gas exhaust, giving a total efficiency above 35%.

Supply guarantee

City gate stations are used to lower the pressure in urban areas by 100 to 200 p.s.i. and in any case below 350 p.s.i. Delivery and metering stations guarantee supply to the public and to industry at utilisation pressures below 80 p.s.i. At the city gate there is generally speaking no metering.

On the stations the different block-valves are of the plug-type either conical or cylindrical, and throttle-valves are equipped with seats and clacks. The filtering equipment consists of cloth and felt filters, ceramic filters, cyclones or multistages of these constituents. There are heaters installed there to maintain the temperature of the gas on the low pressure side at about 45° F.

According to the power required, electric heaters or a hot water exchanger utilising a gas-fired boiler are used.

The heaters are necessary when the pressure-drop exceeds 140 p.s.i.; the heating capacity of which varies with the delivery of the gas and is graded from 40,000 to 400,000 B.t.u. per hour.

Regulators at these stations include a valve and a pilot regulator maintaining a steady, downward pressure. The expansion can be carried out in one stage only between approximately 1,000 and 50 p.s.i.. The combination of two regulators and a diaphragm makes it possible to regulate the gas-flow.

Safety valves allow gas to escape into the atmosphere in the event of an abnormal rising of pressure. They are doubled by aluminium breaking disks.

For metering the gas both orifice and volumetric meters are employed. The former are always placed after the regulator so as to maintain constant pressure. The differential pressure is registered on a diagram, so showing the output. The consumption is obtained by the help of a planimeter.

The latter may be either the dry membrane type working under pressure, or the Delta type with revolving pistons. By connecting it up with the switch clock it is possible to drive a microbreaker or photo-electric cell which produces impulses expressed in the form of hourly output.

This plant is nearly always of the outdoor type, measuring and regulating equipment being kept under a simple shed.

There are two underground storage sites being operated in France at present at Lussagnet and Beynes, while a third at Vernon is undergoing reconnaissance and is in the pre-installation stage.

Absolutely gastight

Lussagnet was discovered and equipped by the S.N.P.A. on a site 35 miles north of Lacq; the porous layer 150 ft. thick is made up of sand and the covering is a clay layer of about 1,500 ft., which guarantees it being absolutely gastight. Its depth is about 1,800 ft. and gas is stocked there under a pressure ranging from 700 to 750 p.s.i.

A stock of 25,000 mill. cu.ft. may be stored at Lussagnet with a gas-cushion a third of this capacity. The water-drive of the structure is favourable and the reservoir has been equipped in such a way as to make possible an output of 180 mill. cu.ft. per day with an equal injection capacity.

On emerging from the storage wells, the gas undergoes a simple dehydration by triethylene glycol and is recompressed to 970 p.s.i. before entering the transport system with a dew-point of -15 to $-20°$ F.

This storage is of the greatest value to S.N.P.A. since it makes possible the regular working of the gas processing plant in spite of seasonal variations in demand. Eventually it may be able to cope with shut downs of the production plant at regular intervals for maintenance, or if part of the plant is out of action.

The underground storage at Beynes, about 25 miles west of Paris, was discovered and equipped by Gaz de France. It carries out a very different function which is to regulate, not the production of gas from Lacq but its transportation and also the rate of supply to the Paris area, according to the considerable seasonal fluctuation in the demand.

40% of total sales

This demand represents about 40% of the total sales of Gaz de France, with an average daily send-out of 140 mill. cu.ft. though in the event of very cold weather (12°F.) it can actually rise to about 350 mill. cu.ft. At Beynes, unlike Lussagnet, we are storing at present manufactured gas at 470 B.t.u. per cu.ft.—coke-oven gas or reformed natural gas—and this raised an entirely new set of problems for the technicians of Gaz de France.

Gas stored at Beynes, being manufactured gas, has to be processed both during injection and withdrawal.

During injection the unsaturated hydrocarbons which may generate gum and so cause clogging in the wells, must be extracted from the gas. This purification process is carried out on active charcoal which also retains phenol, benzole and similar substances.

To extract the sulphuretted and cyanide compounds, as well as ammonia compounds iron oxide is used. Should they not be extracted there is considerable risk of polluting the sheet of water closing the reservoir. Such pollution could possibly extend to the water sheet supplying the Paris area with drinking water although, in the Beynes area, there is absolutely no intercommunication between the two sheets of water.

During the withdrawal of the gas, it must be purified from the H_2S formed in the structure during the reactions favoured by micro-organisms. This process is carried out in the same equipment as that mentioned above after changing the active reagents. The injection and drawing off periods are never the same.

The iron and/or nickel carbon-monoxide compounds formed in the structure and whose presence, even in very small amounts in the gas is responsible for pilot blockages are extracted in an activated charcoal plant.

The Beynes storage equipment has resolved the problem of peak demands in the Paris area and has avoided the need to build costly peak-shaving plants.

The storage at Vernon in the valley of the Seine, 50 miles down-stream from Paris, is actually at the end of the prospecting stage.

The structure is very flat, 1,300 ft. deep and part of it is under the Seine. The covering is good but the reservoir itself is somewhat heterogeneous and is made up of three layers of clayey sand with two possible reserves of 20 to 25,000 mill. cu.ft. each. The pressure is fairly high at 800 p.s.i.

The final objective would appear to be an injection capacity of 90 mill. cu.ft. a day and a drawing off capacity of 140 to 180 mill. cu.ft. a day.

The Vernon storage may not be developed unless important new sources of natural gas are discovered.

Prospecting is also being carried out elsewhere—in Bresse, Central France, and north of the Paris area—as well as research into underground storage facilities for l.p.g. in Provence.

Future developments

What are going to be the future developments of Gaz de France and how will they be effected?

In 1956, a very important year for France, there were outstanding discoveries of hydro-carbon deposits in the Sahara. Those in Edjeleh and Hassi-Messaoud are oil fields and the associated gas will be used for repressurising the deposit, but the field at Hassi-R'Mel is without doubt the most important world accumulation of natural gas. Its recoverable reserves are about 35 bill. (10^{-12}) cu.ft. of non sulphurous gas with approximately 12.5 lb. per mill. cu.ft. of condensable products.

This field is situated south of Algiers, 280 miles from the coast and the structure is between 7,500 and 8,000 ft. deep.

A 24-in. pipe connects the field to Arzew near Mostaganem and a transverse pipeline between Oran and Algiers will come into service in a few weeks' time. Since it is certain, however, that the production from a field of this importance cannot be absorbed by Algeria alone, the ways and means of supplying this gas to Europe are being studied at the moment.

Initially the solution would be to construct a plant to liquefy the gas at $-260°$F. on the coast for transport in tankers to European ports as the British gas industry has imported gas in this form by the Methane Pioneer. This technique offers great advantages in adaptability but has its drawbacks, in particular, the high transport costs.

In France, we are studying plans for the construction of methane-tankers of 9,000 tons deadweight, and it is not impossible that in say, three years' time, we may be bringing methane from the Sahara liquefied in Arzew across the Mediterranean and unloading in France, at Le Havre for example, in quantities equivalent to 18,000 mill. cu.ft. per year.

The price of gas transported in this way has not yet been finally decided upon. An estimate, however, calculated by experts of the Working Party of the European Economic Commission at Geneva, dealing with gas, states the price of gas from the Sahara delivered in the Channel ports and regasified as being of the order of 5.5 to 6.0d. per therm, assuming a starting price of the order of 1.7d. per therm for gas sent to the liquefying plant.

At present it is not possible to confirm or call into question the assumed basic price of the gas, but the transport price of 3.8 to 4.2d. per therm seems to tie in well with the calculations made by specialists of Gaz de France.

Mediterranean pipeline ?

The possibilities of transporting gas by pipeline across the Mediterranean are being studied. Several routes are being considered; one through Tunisia, Sicily and Italy, the second through Morocco and Gibraltar, and the third direct across the sea from Mostaganem to Carthagena. It is this third route which is under particular study by Gaz de France as it seems the most satisfactory if proved technically feasible. It would cut down the total distance to some 1,750 miles from Hassi-R'Mel to the North of Europe—North and East France, Belgium and the Ruhr—which will no doubt be a high consumption area.

During the summer of 1959, a hydrographic survey was carried out on the Mostaganem to Carthagena run of 120 miles. The terrain was very favourable; it was absolutely flat but at depths as great as 9,000 ft.

The methods by which the pipes will be laid may now be considered ready, and it seems that only minor, technical problems created by the difficulties inherent in all work carried out on the high seas now remain.

My own opinion is that we can now look forward with optimism to a sea-crossing by this route with an initial pipeline capable of transporting a daily gas load of some 1,100 mill.cu.ft.—350,000 mill.cu.ft.a year—at a service pressure of 1,000 p.s.i. The main pipeline would be 36 in. in diameter while the sea-crossing would be through several 12-in. pipelines at a pressure reaching perhaps to 3,000 or 4,000 p.s.i.

Transportation cost

The cost of transportation from the Algerian coast to the North of Europe for large quantities of this kind would undoubtedly be lower than in methane-tankers, perhaps of the order of 1.7d. per therm. It would probably take five or six years to carry this scheme into effect.

The most favourable route to be taken on the Continent of Europe seems to be the east coast of Spain including the Barcelona supply region, the Mediterranean coast of France—with a branch off towards Marseilles—the Rhone Valley where it would be linked up at Lyons with the Lacq system. The next section of the route would be towards the north of France with possible branches to Alsace, Switzerland and the South of Germany, the Paris region, and Lorraine. The pipeline would then go through Belgium to the Ruhr and a branch in the direction of Great Britain might be considered, since a Channel crossing would, in all probability, be far less difficult than that of the Mediterranean.

A 36-in. pipeline would seem to be the minimum for the cost of transport to be economic and the placing of 1,100 mill. cu.ft. per day on the Continent of Europe would be perfectly possible in my opinion.

At present there is no precise data on how much gas other countries than France could absorb, but a study recently carried out by Gaz de France, indicates that, for price levels similar to those for the gas from Lacq, the French market could consume as much as 600 mill. cu.ft. per day of gas from the Sahara over and above that from Lacq and coke oven gas available in France, after say 1968 when any such transport system would have been put into service. This volume of gas does not include the quantity which Electricité de France may consume in its thermal stations or that which the metallurgical industry might inject into its blast furnaces. The quantity of gas in each case may well be about 200 mill. cu.ft. per day. These two potential consumers might alone absorb almost the total capacity of the first transport system planned.

Although these figures may appear ambitious, what do they in actual fact represent in proportion to France's energy requirements?

A truer prospective

If they are compared with Tables 1 and 2, a truer prospective appears, which is given in Table 6 assuming that these large quantities of gas actually become available from the Sahara towards 1965/66.

When we consider that, in the United States, gas supplies more than 50% of the thermal energy requirements of the industrial sector, the 26% indicated here does not appear outstandingly optimistic. These are the figures put forward by the Planning Commission as being reasonable for the gas industry's prospects for the ten years 1965-1975, but I am inclined to think that gas consumption by industry in 1975, may well be as high as 3,900 mill. therms, that is, 29% of total requirements. The remaining fuel needs will be covered by solid fuel, about 20%—50% in 1960—and by petroleum products, about 50%—37% in 1960.

Such then are the prospects for the French gas industry for the years ahead. Though it may well have been considered at death's door at the end of the war it is now well on its feet again. This has been made possible by the enormous efforts put into its modernisation. The resources of natural gas already acquired or to be expected, open up vast possibilities of development in the next 15 years, towards which all the technicians and salesmen of Gaz de France can look to with confidence.

TABLE 6

Gas sales mill. of therms	1960 (provisional)	1960 % of total fuel consumption	1965 (expected)	1965 % of total fuel consumption	1968 (in prospect)	1968 % of total fuel consumption	1975 (in prospect)	1975 % of total fuel consumption
Domestic, commercial and various other uses	535	7	730	8	1,190	9	1,525	12
Industrial use, excluding generating electricity and the injection of gas into blast furnaces	917	13	1,370	17	2,500	24	3,500	26
Total	1,452		2,100		3,690		5,025	

DISCUSSION

We attended meetings at both London and Birmingham at which M. Odier read his paper to the local District Section and we are including a report of the discussion in each case.

At the meeting in London, which was attended by members of the London and Southern, and the Eastern Sections, the discussion was opened by the Chairman Mr. J. A. Hepworth and Dr. A. E. Haffner was the first contributor.

Dr. A. E. Haffner, Member and Chief Engineer, the Southern Gas Board, asked whether it had been found necessary at the city gate plant to keep the preheaters in operation throughout the year.

M. Odier: In summer there was no need to preheat the gas; at the beginning there had been some trouble for there had been water left in the pipe. Methane hydrates formed when water was present, and there had been water present at low points on the pipeline. Glycol injection had solved the difficulties.

Mr. C. D Shann, Wm. Press & Son Ltd., wanted to know more about the changeover from coal gas to natural gas as regards calorific value.

M. Odier: There was a big difference. They supplied propane/air at about 600 B.t.u., and 1,100 B.t.u. propane/air could be substituted for natural gas. When they were obliged to build a small plant for peak shaving, they chose a calorific value as high as 1,100 B.t.u. They supplied straight propane besides natural gas, but the gases were very different.

They tried to supply straight natural gas, to clear away smaller distribution systems, and in two years to complete the changeover in big cities like Nantes and Toulouse. They had delayed the realisation of the changeover in smaller centres, but intended to complete the changeover to straight natural gas; in Paris there was not yet enough natural gas.

Mr. S. S. Francis, Woodall-Duckham Construction Co., Ltd., asked how the changeover was made, since they were instituting a whole new transmission system.

M. Odier: With their techniques and facilities they could realise a changeover overnight for 5,000 to 6,000 customers, pre-conversion coming first, with new holes in burners and adaptation of injectors. The bigger distribution systems were divided into sectors; their changeover was then done day by day, one after the other. As they did not want to put too much propane/air into the system, they were obliged to keep a lower calorific value, and shave peaks. They would eventually change over completely to straight natural gas.

Another questioner asked whether it had been found necessary to change mains in towns to avoid leakage when supplying straight natural gas.

M. Odier: When gas was changed there was leakage everywhere. They had fogging devices and it was not so bad. They had doubled the distribution pressure to achieve a better mixture at the burner; with their solvent fogging it was proving pretty good, but they seized every opportunity to replace bad mains by better ones.

Mr. D. B. Parkinson, E.G.B., noted that they were dependent on one gas line and asked what provision was made against failure in that line.

M. Odier: The line could be repaired in about eight hours. He thought that there would not be any interruption in supply; the repair time seldom exceeded eight hours and most work could be completed in a night.

Mr. W. M. Parnell, Ascot Water Heaters Ltd., asked whether, since the price of natural gas was cheaper, the consumption had gone up, and how much they had reduced prices.

M. Odier: They had been able to cut down tariffs by 20 to 25%, although, as the audience knew, their tariffs were high by British standards. For industrial consumers, the reduction was at least 50%.

The increase in consumption was sometimes even 20% in one year, and might have doubled in two or three years. They were very gas-minded, as they were in America. They were now thinking of natural gas and were now competitive with oil.

The increase in the south western part of France was 40% in 1960 related to 1959; when changing over to natural gas they were obliged to clean appliances, repair some services, and with this alone the consumption per capita had increased by 15% in one year. With the changeover to natural gas, they had had a very big selling campaign, and sometimes 50% of old appliances had been replaced by new appliances.

Dr. A. E. Haffner proposed a vote of thanks.

Mr. S. K. Hawthorn, the Chairman, opened the discussion at the Birmingham meeting, which was attended by members of the Midland Section, and Mr. E. T. Pickering was the first contributor.

Mr. E. T. Pickering, Birmingham, asked what was the speed of the gas through the pipeline and requested details of the changeover to natural gas in the Paris area.

M. Odier replying said that the velocity of gas in the pipeline was normally about 12 metres or 40 ft. per second, though it might rise as high as 80 ft. per second. Pressure drops in the coke oven gas mains had an immediate effect on the gas velocity and speeds of 400 ft. per second had been known in times of an emergency, such as a broken pipe.

Referring to the gas supply to Paris, he said that eventually there would be a complete changeover to natural gas. At present 70 mill. cu.ft. per day of reformed gas was being mixed with coke oven gas, but in the course of the next few months the changeover would begin and continue over the next three years.

There would also be a changeover to natural gas over the next two to three years at Lyons and Nantes. For peak-shaving purposes propane-air plants would supply a gas of suitable calorific value, though in Lyons this particular process had not been completely satisfactory; p.f.d. had been a better raw material. He referred to relative calorific values of gases being supplied to some of the towns either connected or to be connected to the pipeline, and pointed out that at present it had been found more convenient to reform the natural gas from a c.v. of 900 to 400 B.t.u. per cu.ft. and to supply it through regulators at .6 p.s.i. The results of 18 months' work on the use of p.f.d. had shown that it could provide a gas of 970 B.t.u. per cu.ft. which was most useful when a change to neat unreformed natural gas was proposed.

Mr. F. L. Atkins, Birmingham, after commenting on so much of the mainlaying practice used by Gaz de France being American—but that had in no way affected M. Odier's English accent—asked whether there had been any difficulties over the seam of the large diameter pipes during welding, which, he presumed, complied with Standard A.P.I. LK-42. He also asked whether fusion or electric welding had been used and whether the joints had been tested by X-rays or by ultrasonic means; had all joints or had merely a sample been inspected. He also wanted to know by what means the completed lengths of main had been tested, whether hydraulically or by air pressure. He was also interested to know whether there had been any trouble from the icing-up of regulators.

M. Odier replied that electric welding not fusion

Biological treatment is the cheapest and easiest answer to the pressing problem of the disposal of poisonous waste liquor at carbonising plants. Strains of bacteria are used to break down the phenolic bodies present in the liquor by micro-biological oxidation into water and harmless material. Six such plants are already in operation and another is under construction. Initial inoculation of selected cultures of freeze-dried bacteria has enabled Simon-Carves to reduce commissioning time from several months to two or three weeks.

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MAIN DOTS THE MAIN

Main dots the 'i'... Main changes its name-style! This is the first outward and visible sign of Main's great new drive for 'Selling in the Sixties'... a long term operation in which new and exciting promotion techniques will stimulate the demand for Main domestic appliances...

Main's exciting new approach to selling will be reflected in Main's press and television advertising, in its display material and sales literature, in its appliance design and even in the company's namestyle. This then, is what we mean when we say: Main dots the 'i'! 'Live modern with Main' — this is the theme of Main's great new drive . . . a drive backed by nation-wide television and press advertising that is destined to widen the market for Main appliances . . . a drive that will help you to sell more of the Main domestic equipment that every modern family needs!

PRESS

Exciting, full colour double page spreads in 'Woman' will vividly capture the 'Live modern with Main' theme during the crucial buying months beginning March and April . . . will be seen in millions of homes at the same time as the powerful television advertising. Extensive provincial press advertising will back this great drive for 'Selling in the Sixties'.

TELEVISION

Powerful nation-wide sixty second television commercials will repeat the 'Live modern with Main' theme throughout the peak buying months. The public will hum the jingle . . . but more important still, they'll remember the 'Live modern with Main' message when they shop for new domestic appliances!

DISPLAYS

Colourful, eye-catching sales aids and sales literature will carry the 'Live modern with Main' theme right into your window and showroom. This will enable you to flag in passers-by who have already seen the advertising on television and in the press!

Watch out for this theme in the press and on television . . .

BSJ

welding had been used. He confirmed the standard of construction of the pipes and confessed that with the 18-in. pipes there had been some difficulty due to distortion. Tests had been difficult to carry out to detect the broken seam. The testing of the joints had been by X-rays throughout, and supersonic testing methods had not been used at all. On all the large diameter mains all joints had been tested, since there had been some trouble experienced with the 24-in. mains.

The testing of the completed sections had been done hydraulically 10% above service pressure and had been maintained for ten days. As regards the icing up of regulators, the installation of gas preheaters had obviated any difficulties. Any pressure drop of 140 p.s.i. or higher made a gas preheater necessary. These varied in size between 400 and 400,000 B.t.u. per hour.

Another questioner commented on the phenomal rate of mainlaying and asked what was the speed and cost of laying the larger mains. He also wanted to know whether the use of ' pigs ' was routine.

M. Odier replied that the rate of laying of the pipe line through the Forest of Larnes had been two miles a day. He estimated the cost at £10,000 per km. The total investment in the whole project had been 70,000 mill. old francs, of which 60,000 mill. old francs had been spent on the natural gas well and 600 mill. old francs on the underground storage at Lussagnet. ' Pigs ' were used regularly for ensuring that mains were kept clear. In reply to another question as to whether inferential meters were used as a basis for charging, M. Odier said that they were and had an accuracy better than 1.5%.

Mr. F. B. Halliwell, Leicester, asked what was the minimum radius allowable for the main pipe line bends and also wanted to know some details about ' concrete aprons.'

At this point there seems to have been some misunderstanding of the question, but the information supplied by M. Odier was, we thought, interesting in itself so we are quoting his answer fairly fully.

M. Odier pointed out that there were pig traps every 20 miles, and before a river crossing or delivery points to ' city gate ' local distribution systems. Valves were placed at suitable intervals on the main pipelines which enabled sections to be isolated in case of an accident. These were easily accessible and were placed five miles from the ' main gates.' These valves had also been put in on the Lorraine coke oven main at the same intervals. As regards the minimum radius of the bends to which the pipelines could be laid, he said that this would be about 50 times the diameter of the pipe. The ' pig,' however, was not a rigid object and could bend slightly so should be able to pass along a pipeline laid to limits such as these.

Mr. W. R. Branson, Deputy Chairman, W.M.G.B., was struck by the author's grasp of English weights and measures, and congratulated him on his paper. Referring to the planning for the transport of gas from the Sahara, he said that gas delivered in Europe at 3.5d. per therm was so cheap that no other fuel could hope to compete. He did not think that the share of gas as 25% of all fuel for industrial purposes was unduly low, and saw no need to compare it to the higher proportion enjoyed by the gas industry in America. He also throught that M. Odier's estimates for an increase of only 7 to 8% in domestic consumption were pessimistic. He presumed that Gaz de France needed to find large consumers in the early years of increased gas availability to get the gas moving; later small consumers would follow when the new service became established.

M. Odier replied that ' when natural gas had first become available, tariffs had been cut by 20-25%, but the local distribution systems supplying domestic consumers were run jointly in France with the electricity industry, so the success of gas consumption in this sector depended very much on how it suited its competitor. Should Sahara gas arrive in France, promotional tariffs all over France would become a possibility. Consumption had already risen 2 to 2½ times in two or three years in some districts. The average domestic customer consumed 80 therms a year. The heating load should increase by 15 or 16%, but even then would not be as high as in the U.S.A., where total domestic demand per consumer might be 1,000 therms per year.

In 1968-70 there should be the same tariffs all over France as were now in the south. Central heating was spreading, but much of it was some form of district heating and it was difficult to build up a load against this, and also to compete against coal and oil. In some building estates, however, the inhabitants were becoming gas-minded.

Mr. F. Harvey, Walsall, the senior vice-president, proposed a vote of thanks, to which there was an enthusiastic response from members.

Technical developments

Slewing ring

A Roballo ball bearing slewing ring supports the tilting beam of this travelling tippler, which is able to discharge wagons up to 40 tons in weight.—Roballo Engineering Co. Ltd.

From Dunlop Belting Division, Speke, Liverpool, comes a booklet called ' New Industrial Laboratories for Belting Division ', which describes the organisation and equipment at the Speke factory. These laboratories are able to draw on the work carried out at the Dunlop Research Centre in Birmingham, and a joint committee meets regularly to discuss projects and initiate new research. This system of organisation enables the Division to take immediate advantage of new knowledge.—*Dunlop Belting Division.*

From a paper read to the Manchester District Junior Association of Gas Engineers.

Ten years' work for safety

By H. G. HALL, A.M.I.MECH.E.,

SAFETY OFFICER,
NORTH WESTERN GAS BOARD

A SURVEY of the various works in the North Western area shortly after nationalisation revealed widely varying standards of safety. In some conditions were quite good and it was obvious that much thought had been given over the years to the welfare of the workpeople. In others, however, even allowing that the war had not long been over, conditions did not appear to have advanced much since the early 1900's, and were far below those considered acceptable in other industries. A great deal was heard, at the time, about certain works which had made cheap gas. Judging by the condition of some plants and the lack of amenities for the workpeople it was not surprising that the gas was cheap, but it must have been dear in terms of discomfort and sometimes danger to the workpeople.

Accident reporting

At that time no procedure had been laid down for the reporting of ordinary accidents, but news of major disasters or fatal accidents was sent in by telephone. In order to see the picture as a whole and to be in a position to judge what kind of remedial action might be helpful it was necessary to set up a complete accident reporting system. Once this went into operation it was found that we were suffering just over 1,000 disabling accidents each year. Analysis of these indicated lines of action and training which were then put in hand.

It was patently impossible for the Board's safety officer alone and unaided to investigate all the serious accidents which occurred, especially if the inspection of works and the training of workers was to be part of the safety programme. It was decided, therefore, that a number of safety officers should be employed, so stationed as to cater for the needs of about 1,500 workers or fewer in the more widespread groups. These officers were to be on the groups' staff directly responsible to the Group General Manager. That the managers of today realise their usefulness is a tribute to the hard work put in by the various safety officers since they were appointed.

Once the basic set up was agreed, the design of which owed a good deal to the system in operation for a number of years in the North Thames area, we were able to consider the problems which were obvious or which showed up as the accident reports began to pour in. Inspection of works revealed many shortcomings in means of access and places of work, while the systems of work were often only designed for speed or convenience without much thought for safety.

From time to time we (and other Boards) may suffer a serious explosion while emptying purifiers. As a rule material damage is slight, but there may be several men quite badly burned or injured. If all purifiers are thoroughly purged with inert gas, these things cannot happen; but what will it cost and are there other means of achieving the same end? A study of the problem led to the conclusion that the necessary equipment for the area would cost £120,000 and that is a lot of money.

Consideration of the reports on such accidents showed that, in every case, there had been some deviation from the very excellent 'Code of Practice for the Safe Operation of Oxide Purifiers' laid down by the Safety Rules Committee of the Institution of Gas Engineers. It was suggested therefore that the answer lay in strict adherence to the rules. There has been one major explosion in the last five years, and once again the rules were not followed exactly.

We have implemented many reforms, some of which are visible, such as the flameproofing of dangerous situations, the use of low voltage tools, permits to work, safety shoes, crash helmets for motor-cyclists, and other equipment, but other and perhaps more important changes have taken place in the attitude to safety of our technical staff. It is no longer the exception to call in the safety officer at the design stage of projects, nor is it rare to find him assisting in the supervision of unusual and difficult jobs.

In achieving this state of affairs we have been greatly helped by the Training and Education and Medical Departments of the Board. Safety sessions are now included in suitable courses at the Board's staff colleges at Mere and at Salford Technical College, and management courses are run nationally by the industry. Close liaison with the medical side has resulted in a lot of good work being done in training many workers in First Aid, the use of breathing apparatus, artificial respiration and the treatment of those affected by gas.

Rate stabilised

The rate at which accidents have occurred has come down appreciably over the years, but not perhaps as rapidly as could have been wished. We seem to have stabilised the rate this last year or so, and are making slow progress at present. Last year, however, several other boards' figures worsened, so perhaps we did well to stand still.

A study of the reported accidents shows that there are far fewer really serious accidents than there were in the early 1950's; there are certainly fewer that are fatal. Though our aim is to conduct our business without serious accidents, we have only managed one financial year—1956-57—since vesting without a fatal accident.

The duration rate or time lost per accident should be some measure of the severity of the injuries received, but this can be affected by many other factors, not the least of which are (a) the system whereby a man loses three days pay unless he is off for 12 days, and (b) the morale of the workers themselves. Reductions in manpower and changes of group structures during the last few years have sometimes left morale rather low with its inevitable effect on accidents.

All things change, not least the gas industry, and during the last ten years many changes have taken place which have an effect on the safety of the workpeople. We aim to foresee the accident before it happens, but when that has been accomplished, it is not always easy to persuade manufacturers or even gas engineers that the risk is real.

The replacement of plant, machinery or process by later developments may eliminate certain dangers, but the hazards of the new system will be unknown and may even be more serious in their effects. If we do not consider these possibilities at the outset, we may run into trouble.

The drag bars, flumes, lip and gravity bucket elevators of days gone by have now been largely replaced by belt conveyors. Belts have serious trapping hazards at a number of points, which must be guarded if accessible, and it is wise to guard them even if not usually accessible. Mobile conveyors tend to be overlooked, but injuries from them can be just as serious as from fixed belts.

Mobile plant

A wide variety of mobile plant is being used. More and more coal comes in by road, and heavy loads may now be taken on roads not suitable for the traffic; gas mains beneath may suffer.

Special vehicles have special problems. The instability of fork-lift trucks when travelling calls for careful training of drivers. The use of mobile cranes on gradients or bad surfaces, or without outriggers, or ignorance of the effects of working them under wrong conditions, all lead to accidents of the overturning type.

Tipping lorries sometimes have the tipping control valve behind the cab. Many drivers have been trapped by the descending body.

Airborne sealing, retort welding and spraying are accepted methods of prolonging the life of gas-making plant, but there may be a silicosis risk in handling these fine dusts. Respirators might be prescribed but, as with other forms of personal protection, they are the last line of defence. Modern designs incorporate self feeding fans for airborne sealing, and the sieving of the powder for welding can be carried out in an enclosure; Silicit for spraying can be purchased as a slurry.

Working below a hot retort may result in burns from hot particles, and if the temperature is high, as in ovens, there may be a danger from infra red light. A suitable helmet and cape with a tinted visor gives protection.

Welding and cutting are not new, but as their uses increase, they bring changed methods with them. The welder may be well protected but often there is insufficient protection by portable screens for other people. Forethought can usually ensure that any fires caused by welding can be extinguished before they become serious.

The traditional slate roof has given way to asbestos protected steel sheet, aluminium and other manufactured materials. The asbestos cement sheet, widely used in place of corrugated iron on account of its cheapness and freedom from corrosion, has been involved in fatalities by becoming brittle after slightly ageing, though appearing sound and capable of sustaining the weight of a man. New materials including resin bonded, which do not have this defect and are of much more pleasing appearance are now available.

Demolition is always a hazardous job, and if undertaken by board labour, great care must be taken to plan the work to avoid damage to personnel or property. Anything large should be in the hands of specialists.

Various commercial considerations have made it economic to use the light petroleum fractions for gas manufacture, but the storage and use of these products means that safety must be considered right from the design stage, and the works engineer should be brought into all the technical discussions.

However the p.f.d. is used, its storage presents a fire hazard and certain precautions must be taken. The location and arrangement of the site will have to be agreed by the petroleum officer for the district who will concern himself with the bunding of the tanks, control of drainage, provision of fire extinguishing equipment and the electrical bonding of all pipelines. When satisfied he will issue a storage licence which will probably contain further stipulations about fencing the site, giving notice of accidents, 'No smoking' notices, earthing of vehicles and the use of flameproof or intrinsically safe electrical gear.

When used in water-gas or Onia-Gegi plants, the p.f.d. is brought to the reaction vessels as a liquid, so leakage at any point cannot be contemplated. Pipelines should be welded as far as possible. Since petrol vapours are heavier than air concentrations may build up at or below floor level; foam or dry powder fire extinguishers must be available.

Where the p.f.d. is vaporised and mixed with steam before being admitted direct to vertical retorts, it has been found that the mixture will not burn, so that by keeping the vaporiser outside the retort house there is little danger. But, though it will not burn, it is possible that there may be some condensation, so that the run of drains from the pipeline must be considered. All pipelines and vessels must be electrically bonded, so also must the tank wagon delivering the oil to the site. The p.f.d. should not be allowed to fall freely from an open ended pipe, and the delivery pipe should dip to near the bottom of the tanks.

The handling of heavy oils does not have the same fire hazard as with p.f.d. but there is enough vanadium contained in such feedstocks to cause trouble to men required to empty catalyst vessels or to clean the flue dust from oil-fired boilers; precautions may entail the provision of dust masks or even air line respirators and boiler suits with arrangements for laundering these latter garments. Washing facilities and barrier creams also play their part in preventing skin irritation.

Coke stocks

The large quantities of oxygen needed by some newer gas manufacturing processes require it to be made and stored as a liquid. Since this boils at $-297°F$. it involves problems of cryogenic engineering—outside the scope of this paper—but where oxygen is liable to escape as a gas at atmospheric pressure there are many hazards of combustion and explosion due to its contact with carbonaceous materials. Thought must, therefore, be given to the cleanliness of the surroundings and to the kind of work that men are sent to do near to such plants.

Although coke stocks may appear harmless enough, dangerous situations can be created when lorries run up on the heaps to deposit their loads. Heavy stop blocks should be provided to prevent over-running, the roadway should be clearly marked with sleepers or something similar, and whenever coke is taken from stock, thought should be given to the effect on the whole mass. Tipping lorries should preferably be of the short wheel-base type, and should only be allowed to tip when on a firm and level standing; the rear door should always be free to open before tipping, while cab doors should be kept shut.

Frequently these heaps are built up by tipping from the head of a large portable elevator, of which the conveyor belts and head pulleys have not been guarded by the makers on the assumption that they are out of reach. A man sent to trim the top of a coke heap, however, may well be within easy reach of the head pulley or even part of the

return belt. These units should be fenced to the same standard as fixed installations.

Although it is not likely that X-rays will be used on a works there is a real possibility that gamma rays may, especially in connection with the new high pressure pipelines for distribution. Some responsible person must be trained in how to use such equipment and precautions must be taken to keep everyone else at a safe distance. Sealed or even unsealed radio-active isotopes might be used for very special investigations and these too would call for the most careful handling.

At present little is known about the effect of railways electrified to 25,000 V. a.c. on their surroundings, but it is known that the track is not completely bonded so return currents may find their way back to the substation through the mass of earth which will naturally include any convenient gas mains. If a works adjoins a railway which is being electrified, it will be wise to bond any pipes before they are cut.

Unearthed metal work close to the overhead system can accumulate a considerable charge of static, so metal fences, pipework or plant, even metal roof gutters may become sufficiently charged to give a man a nasty shock. If this caused him to fall from a ladder the results might be very serious. Since the current is alternating it is not anticipated that there will be any increased likelihood of electrolytic corrosion.

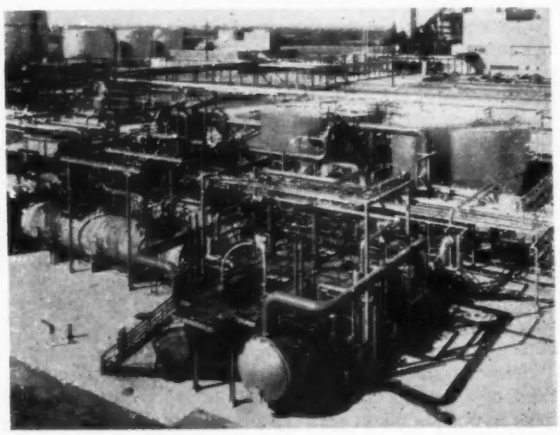
It is customary for new workmen to be given a brief indoctrination in safe working, but it is doubtful whether the same treatment is always given to junior technical assistants or chemists. These latter may be recruited straight from the University or Technical College without any convictions about safety and even perhaps believing that safety is a sign of decadence. Workmen, having risen from the ranks have some tradition of safe practice, but our newly qualified chemist or engineer has no such background, since our educational establishments as yet place little or no emphasis on safety in technical training.

New technology in sulphur recovery from sour gas

DURING the period 1956 to 1960, sulphur recovered from sour gas rose from .75 to 2.25 mill. long tons per year. In 1961, output of the world's 85 recovery plants is expected to be 3.5 mill. tons. Average annual growth rate is 40% compared with 4% for sulphur production from all sources.

Several factors have been responsible for the rapid expansion in sulphur recovery from sour gases. On the purely economic side, the principal incentive came from the rise in sulphur price which was experienced during the early 1950's—a trend which has since then been reversed.

Other factors operate at the same time to make sulphur recovery an attractive business in many natural gas operations. Three major steps are involved: Removal of hydrogen sulphide from the gas, dehydration of residual gas, and conversion of hydrogen sulphide to elemental sulphur. Of these three steps, the first two must be carried out in any event in order to satisfy the requirements of the gas transmission system and the demands of the gas market.



Sulphur recovery at Tidewater's Delaware City refinery, U.S.A.

The third step—conversion of H_2S to elemental sulphur—offers a means to convert a nuisance by-product to a saleable commodity. Activity in this field is thus controlled by two main factors: The more extensive need to use sour gas, and the gas industry's increasing concern with air pollution.

Technically, the conversion of H_2S to sulphur is carried out by air oxidation. Today's commercial plants operate on various processes, all of which operate the reaction in the vapour phase. Two main steps are involved: Oxidation of one-third of the hydrogen sulphide feed to SO_2, usually carried out in a waste-heat boiler. This is followed by reaction of sulphur dioxide with the remaining two-thirds of the hydrogen sulphide to yield sulphur.

$$2/3\ H_2S + 1/3\ SO_2 \longrightarrow S + 2/3\ H_2O$$

This second reaction step is carried out catalytically at about 280°C. Current U.S.A. practice favours the use of low-iron activated bauxites as catalyst in this reaction.

During the last 3 to 4 years, extensive work has been carried on toward the development of liquid-phase sulphur conversion processes. Various advantages are claimed, notably simpler operating equipment, economic suitability for smaller plants, ability to combine the operation with other gas treating steps, and the suitability for dilute H_2S streams. Several such liquid-phase processes have been announced and are receiving considerable attention. It will be of interest to outline the main approaches which are being taken by the leading commercial vapour-phase processes, and which are proposed in the new liquid-phase methods.

1. Vapour-phase processes. Partial oxidation of hydrogen sulphide to sulphur is a series of equilibrium reactions in which different forms of product sulphur play a role. Best theoretical conversion is obtainable at low tempera-

tures—about 99% at 130°C. As the temperature is increased, theoretical sulphur formation passes through a minimum value of 53% between 530 and 630°C. Above this temperature, conversion at equilibrium picks up again, reaches a maximum value in the 70 to 75% range.

Accordingly, the high-temperature reaction which is carried out thermally in a boiler, cannot achieve more than 70 to 75% conversion to elemental sulphur. Process gas leaving this stage must be cooled quickly to avoid the unfavourable equilibrium which occurs at 530 to 630°C. Finally, the catalytic conversion must be carried out at the lowest temperature which is compatible with considerations of sulphur dew point and of practical space velocity.

Catalytic stage

In the catalytic stage, a key problem is the formation of carbonyl sulphide (COS). This by-product causes air pollution difficulties and cuts down sulphur yield. The problem, which is particularly pronounced in conversion of CO-rich hydrogen sulphide streams, can be solved by permitting COS to react with SO_2 to form carbon dioxide and sulphur. This reaction is accelerated by the catalyst employed in the main conversion but space velocity is unsatisfactory at the low temperatures needed for good sulphur yield from H_2S.

The problem can be overcome by operating the catalytic conversion in two stages. The first stage is operated at about 400°C. to permit completeness of carbonyl sulphide conversion at tolerable space velocities. The second reactor is run at 260 to 300°C. to finish up the hydrogen sulphide conversion which is more rapid but which has an unfavourable equilibrium at high temperature. This low-temperature stage may itself be carried out in two successive reactors, with intermediate sulphur removal. This three-stage approach is highly efficient—99% sulphur recovery—but can in general be justified economically only where air pollution limitations are very stringent.

Because conversion is limited to equilibrium at the dew point, intermediate sulphur removal in a two-stage catalytic converter system can also raise recovery significantly. Another approach, developed by Great Lakes Carbon Company is to dilute the H_2S content of the feed gas to the catalyst cases, *e.g.* by recycling part of the plant's tail gas.

In most designs, the reactor product gas is cooled and then scrubbed with liquid sulphur. Close temperature control between 120 and 150°C. is essential because the sulphur viscosity reaches unmanageably high values outside this range.

Product sulphur for transport to buyers may be pumped into insulated tank cars, which are provided with steam coils. Alternatively, it may be solidified on cooled belts or flaking drums and the resulting flakes loaded into box cars.

2. *Liquid-phase processes.* During the last few years several liquid-phase processes for sulphur recovery have been announced. Their potential advantage rests in direct applicability to streams of low H_2S content—minimum feed concentration required for vapour-phase oxidation is 50%. The result is ability to combine gas scrubbing with sulphur conversion into a single operation, and potentially favourable economics for units as small as ten tons per day. Furthermore, advantages of easier control are claimed and initial investment may be lower because liquid-phase conversion is carried out in a single stage while vapour-phase oxidation, as we have seen, is carried out in 2 to 4 stages.

Against this, liquid-phase processes must compete with highly developed commercial technology of vapour-phase conversion, and their low chemical and labour requirements. Furthermore, in locations where extraction of H_2S from sour gases is already practised, vapour-phase oxidation does represent a simple and low-cost addition to the total plant facility. Finally, vapour-phase conversion yields a credit from by-product steam.

Among liquid-phase methods, only the Stretford process, developed jointly by Clayton Aniline Company and the North Western Gas Board of Manchester has so far found commercial utilisation. The process serves at two British plants for simultaneous sweetening and sulphur extraction from gases of low H_2S concentration, namely at Rochdale—100 grains of H_2S per 100 cu.ft.—and at Whitchurch—30-40 grains per 100 cu.ft. of gas.

In this process, sour gas is contacted with an aqueous solution of sodium anthraquinone sulphonate. In the course of contact, H_2S is oxidised to sulphur, while the anthraquinone is reduced to the corresponding hydroquinone. The liquid stream passes through an oxidising tower where contact with air regenerates the anthraquinone. The resulting slurry of reagent solution with sulphur is vacuum-filtered or centrifuged. Sulphur is washed on the filter and the reagent solution is recycled to the sweetening tower.

Sulphur formed in this process is reported to be easily filterable. Earlier liquid-phase methods have resulted in colloidal sulphur which is difficult to filter. Two such methods are known to have found commercial application. Their economic justification rested on the formation of premium-priced sulphur of high purity and colloidal particle size for use in agricultural applications.

Another new liquid-phase process for simultaneous desulphurisation and sulphur recovery has been developed by Townsend of the University of Oklahoma. In this method, sulphur or hydrogen sulphide is burned to sulphur dioxide—as in vapour-phase methods. The resulting SO_2, together with sour gas, is passed into a liquid medium made up of triethylene or diethylene glycols, containing 2 to 5% water. The reaction between SO_2 and H_2S takes place in this medium, forming sulphur which is settled from the reaction solution. The glycol solution itself is distilled for removal of excess water, and is then recirculated to the reaction column.

Two reaction stages

The Atlantic Refining Company has piloted liquid phase H_2S oxidation in which air is the oxidising agent, and iron chloride acts as oxygen carrier. Two main reaction stages are employed. In one of these, ferrous chloride is oxidised to the ferric form by contact with air; in the other, ferric chloride is reduced to the ferrous form by reaction with H_2S, thereby converting the latter to elemental sulphur. For concentrated H_2S feeds the two reactions may be carried out simultaneously; in the case of dilute H_2S, a two reaction column is called for.

A key aspect of the process is the use of iron chloride in the form of a chelate, namely as ferric versenate, which has the effect of maintaining a single phase at the required alkaline conditions. Sulphur recovery is reported at 97%.

A number of other processes have recently made the news. These include: (1) Giammarco-Vetrocoke in which H_2S is absorbed in an aqueous solution of arsenic trioxide, caustic soda, and water. The resulting solution is air-blown to yield sulphur and regenerate the absortive solution. An earlier process, under the name of Thylox employed a somewhat similar system; (2) the Haines Process in which beds of zeolite—calcium aluminosilicate—are operated on a cyclic adsorption-desorption cycle. In this method, H_2S is adsorbed on the porous zeolite. This is later regenerated with SO_2 at 600°F, whereby H_2S is converted to sulphur which is carried from the system in vapour form.

1961 inland energy needs may approach 270 mill. tons coal equivalent

INLAND energy requirements in 1961 may be not far short of 270 mill. tons of coal equivalent, depending on the level of economic activity, weather conditions and other factors, and may rise to about 300 mill. tons of coal equivalent in the later 1960s. The shares of the various sources of energy will depend on their competitive ability. This information was given by Mr. J. George, Parliamentary Secretary to the Ministry of Power, in a Commons answer.

He had been asked what, in terms of coal equivalent was the inland consumption of coal, oil, natural gas, hydro-electric energy and nuclear energy, respectively, and, in total, for each of the years 1956 to 1960; and what, in similar terms, was the estimated consumption for the years 1961 and 1965.

He gave the following table as an answer to the first part of the question:

NEWS SUPPLEMENT

INLAND CONSUMPTION OF ENERGY

	(Mill. tons coal equivalent)				
	1956	1957	1958	1959	1960
Coal (1)	214·1	207·7	198·7	186·9	195·6
Oil (2)	38·0	37·2	47·6	56·1	65·6
Natural gas (2) (3)	0·02	0·03	0·06	0·10	(0·1)
Hydro-electricity (4)	1·3	1·5	1·4	1·4	1·7
Nuclear ,, (4)	0·03	0·2	0·15	0·6	1·0
	253·4	246·6	247·9	245·1	264·0

(1) After adjustment for coke, etc., exported or put to stock. The figures previously published have been slightly amended. Total inland coal consumption in 1960 was 197.0 mill. tons.

(2) The coal equivalent of oil and natural gas is taken as 1.7 times its weight.

(3) Mainly methane from coal mines, but includes about 0.02 mill. tons coal equivalent of imported methane in 1959. The 1960 figure is not yet available, but is expected to be roughly the same as in 1959.

(4) Converted to coal equivalent according to the amount of coal needed to produce electricity at the current efficiency of steam stations.

'Comfort in the home'

The 'Comfort in the Home' Exhibition, currently running at the Royal Horticultural Hall, London, will remain open until February 18.

THEY GO ON

Gas Purification Ltd., has produced and distributed purifying materials and given service to the gas industry for nearly a century, being one of the first to import natural bog ore into the United Kingdom, and will continue in this field.

A contrary impression may have been assumed from a recent Press report, says a statement issued by the company.

'Drying' lectures

A COURSE of lectures on 'Drying' will be given at the National College for Heating, Ventilating, Refrigeration and Fan Engineering at Borough Polytechnic, Borough Road, London, S.E.1.

Under the heading of Advanced Heat Transfer, the course of ten lectures entitled 'Drying (and the theory of heat and mass transfer)', will be given by Mr. E. Woodcock, Lecturer in Heat Transfer at the National College.

The lectures will be given on Monday evening beginning on April 10.

GAS AT THE IDEAL HOME EXHIBITION

GAS equipment and appliances of all kinds and for all purposes will once again be on show when the Daily Mail Ideal Home Exhibition opens at Olympia on March 7.

The Gas Council will have three displays. At the Gas Pavilion in the Grand Hall they will present 'Mr. Therm's Top Ten' which puts on show every kind of gas appliance, including cookers and refrigerators, room heaters, automatic heaters, gas-fired central heating and warm air systems.

The second display, also in the Grand Hall, is devoted to central heating by coke, with a display of the latest coke fires; and the Council's third stand, in the Grand Hall Gallery, will have as its theme 'Comfort for the Smaller Home.'

Cannon stands

Cannon (GA) Ltd. will have two stands, at both of which will be seen their new range of kitchen appliances. Parkinson Cowan Appliances Ltd. will have on show for the first time their new compact gas cooker, the Peeress.

Stoves Ltd. will be showing the Newhome range, including the new 154A Newhome Cabaret, a medium cooker. Sidney Flavel and Co. Ltd. will be showing their new Envoy Automatic Cooker, and the Courier, a small-space cooker.

R. & A. Main Ltd. will have an extensive range of their gas appliances on show, including cookers, space and water heaters, wash boilers, washing machines and refrigerators.

Allied Ironfounders Ltd., Gas Appliances Division, will be showing the Leisure '60' cooker, together with the large Cavalier de luxe cooker.

Radiation Displays

Radiation will have two displays: Radiation Group Sales will feature their latest gas cooker designs with the New World Seventy-Two built-in cooker shown in kitchen fitments; other New World cookers will show the use of stainless steel on the hotplate. The New World refrigerator, room and water heaters will also be seen.

Radiation Parkray Ltd. will feature modern fanned warm air central heating from the gas-fired Ductair G.105. Other gas, oil or solid fuel boilers, heaters, etc., will also be seen.

Thomas Potterton Ltd. will be exhibiting a full range of gas-fired boilers for domestic central heating and hot water supply, including a new range of Diplomat gas-fired boilers.

Several other exhibitors will be showing central heating systems, and heating appliances, using solid fuel and oil fuel as well as gas. They include: Domestic Installations Co. Ltd., Glow Worm/Sunrod; Ideal Boilers and Radiators Ltd.; Janitor Boilers Ltd. and Perkins Boilers Ltd.

WEST MIDLANDS SELLS IN RHYME

HOME Service Advisers of the Birmingham Division of the West Midlands Gas Board acted the play 'The Old to the New World' at the 'Conversazione' of the Birmingham and Midland Institute. The play features an 1878 gas cooker with costume and kitchen in keeping. Alongside the 'Old World' a modern kitchen with a New World 77 showed dramatically the advance made in design, colour and efficiency in the latest gas appliances.

In rhyming verse, the ladies discussed their respective cooking equipment. The play lasted some seven minutes; it was repeated several times to a changing audience and won applause and interest. Supporting this feature was a demonstration of sweet-making given by other Home Service Advisers.

At the 'Conversazione,' which is a well known annual event in Birmingham social and civic life, members of the Birmingham and Midland Institute and other leading citizens meet to discuss the latest scientific and cultural developments. The display of working models and other exhibits covers a remarkably wide and varied field.

New engineering company formed

A NEW company has been formed by Lanarkshire Builders Ltd., and Peter Lind and Co. Ltd. This Company was incorporated recently and its registered office is at the office of Lanarkshire Builders Ltd., Mossend Bellshill, Lanarkshire, who are joint proprietors of the new Company with Peter Lind and Co. Ltd., Civil Engineering Contractors of Westminster, London.

The Company has been formed to carry out contracts in Scotland, in both civil engineering and building work.

The Directors are Mr. T. M. Jaeger (Chairman); Mr. E. M. Barnes; Mr. H. H. S. Mygind; Mr. J. McW. Norman; Mr. F. E. Prior; Mr. R. D. Stewart.

The formation of this new Company will not limit the activities of Lanarkshire Builders Ltd.

February meeting of Yorkshire Juniors

THE February meeting of the Yorkshire Junior Gas Association heard Mr. G. Davies, Divisional Sales and Service Manager, Sheffield, present his sales and service paper called 'Getting into focus.'

Mr. Davies stressed the need for sales and service men to view both their own problems and particularly those of the customer from the customer's point of view as well as their own.

Scottish Board to try new payment scheme

THE Scottish Gas Board is to experiment with a new system of collecting hire purchase payments from prepayment customers.

A pilot scheme will be operated in the Glasgow area, the Scottish Gas Consultative Council was told in Edinburgh recently. Instead of rendering quarterly accounts for hire purchase payments it was proposed to take payments from the rebate on gas consumed.

This will not only reduce the costs of the Board, but should help customers, as the amount of money that they will have to find will be eliminated or reduced by the amount of the rebate, and it will be unnecessary for them to pay it at a showroom or make remittances by post.

If the scheme is successful in Glasgow it will be extended to other parts of Scotland.

Midland homes robbed by bogus meter collector

ALL householders in the Midlands who have shilling-in-the-slot gas meters have been warned to be on the watch for a bogus meter collector. The warning came from the East Midlands Gas Board through the Press, radio and television, and concerned a man who, during the last few weeks, has stolen considerable amounts of money from homes of old age pensioners in six Midland towns.

A spokesman of the Board said that reports had come in from Leicester, Derby, Mansfield, Newark and Sheffield of the bogus collector, who seemed to be visiting a different town each day. It appeared that so far it had only been at the homes of old age pensioners where he had struck.

The Board asked all householders to demand to see the 'right of entry' card carried by all authorised collectors. They were also asked to ensure that collectors were wearing the official Board uniform.

If anyone was suspicious of a person posing as a meter collector he was advised to contact the police immediately.

U.S.A. home heating controls sales hit £10 mill. peak

CONTROLS for American domestic whole-house heating reached a sales peak of $24 mill. (£10 mill.) in 1960, an American survey reveals.

The survey, recently completed by the American associates of Honeywell Controls Ltd., showed that sales for heating controls had increased by $1.286 mill. over 1959, and had doubled in the last ten years.

Sales of residential automatic controls reached a total of $150 mill. during 1960—the product of 35 major control companies.

Sales of automatic heating equipment (furnaces, boilers and associated equipment) reached $4,000 mill.

The control and heating industry employs 1.3 mill. people. Of these, 800,000 are employed by manufacturers and installations and servicing organisations.

The survey also noted that virtually all homes constructed or modernised in the United States include some form of automatic heating. Commenting on this, Mr. K. L. Wilson, Vice-President of the American Honeywell organisation, said that, despite the appearance that the industry had reached its ceiling, he foresaw great potential in the increasing popularity of domestic air conditioning and electronic air cleaning plant.

The pride of the family...

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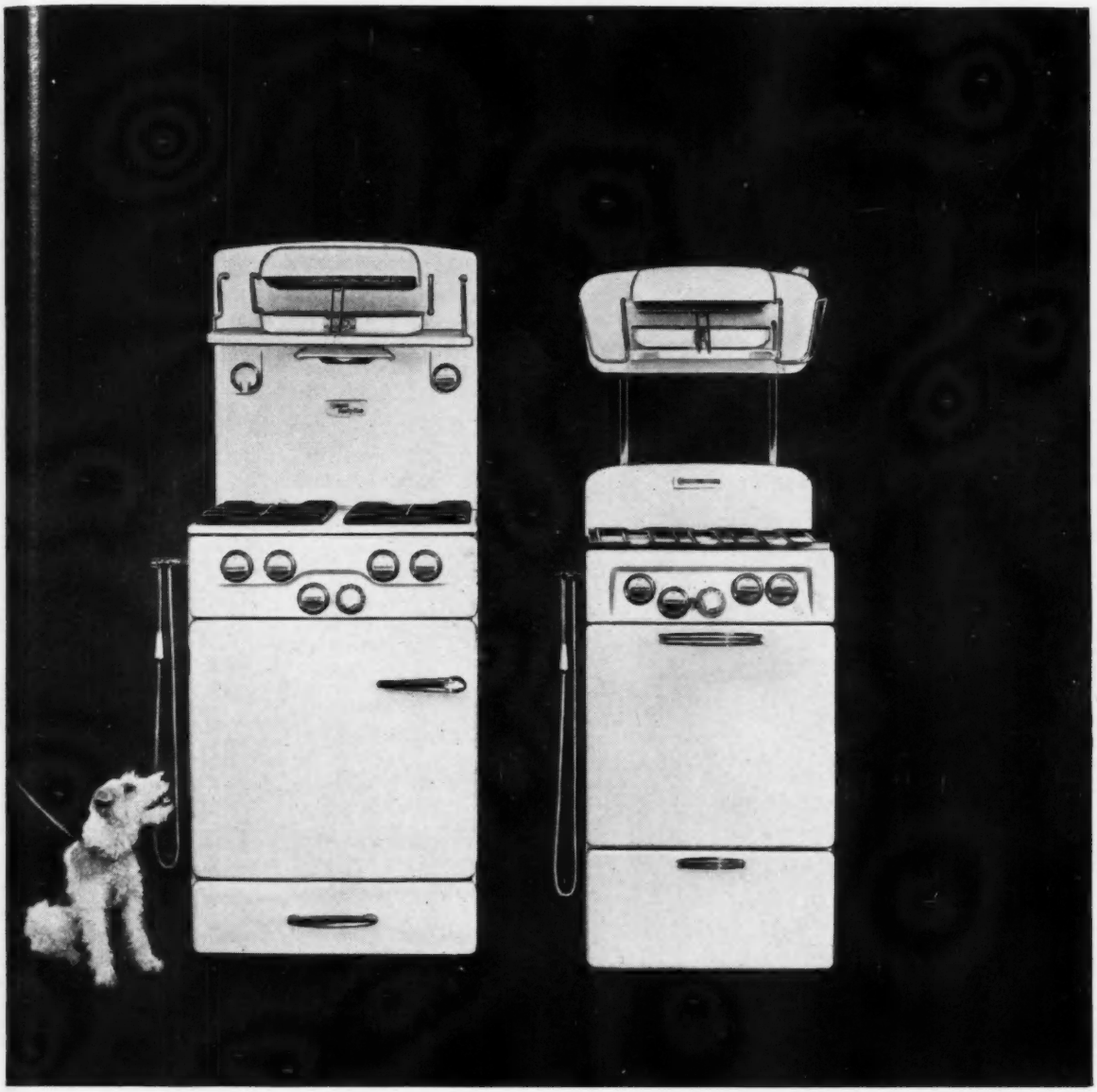

NEW WORLD

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CORROSION INSTITUTE SUGGESTED

THE formation of an Institute of Corrosion was suggested by Mr. C. L. Wilson at the 2nd. Annual Dinner of the British Association of Corrosion Engineers.

Mr. Wilson also suggested the classification of workers in the corrosion field into research workers, specialists and general practitioners, on the lines of the medical profession. The corrosion engineer was the G.P. of the profession; to find the answer to any problem he must have the backing of specialists and research workers.

From the start

Corrosion engineers should be called in to assist designers from the initial stages. Frequently, in fact, he was not called in until the building was in danger of falling down, and was told to do something about it.

He thought the three bodies concerned, the Corrosion Science Group led by Dr. T. P. Hoar, the corrosion group of the S.C.I. and B.A.C.E. should get together and form a body to correlate work and disseminate information. The Institute of Corrosion was his own private idea.

The Borough of Fulham was among the first to introduce smoke control areas, and their fourth—and largest—smokeless area is due to come into operation next October. The North Thames Gas Board was among the exhibitors at the Fulham Borough Council's recent Clean Air Exhibition. This was the Board's stand. Among the visitors were the Mayor of Fulham (Councillor Mrs. Pusey, J.P.), who was accompanied by Councillor J. W. Perotti, a member of the North Thames Gas Consultative Council.

Weekly statistics

THE total amount of gas available at gasworks for the week ended January 29, 1961, was 71.5 mill. therms. Coal consumed by the gas industry during the week ended January 28, 1961, was 529,000 tons and by coke ovens in the same period 570,000 tons. The gas industry held, during that week, 1.575 mill. tons of coal stocks, and coke ovens held 1.38 mill. tons.

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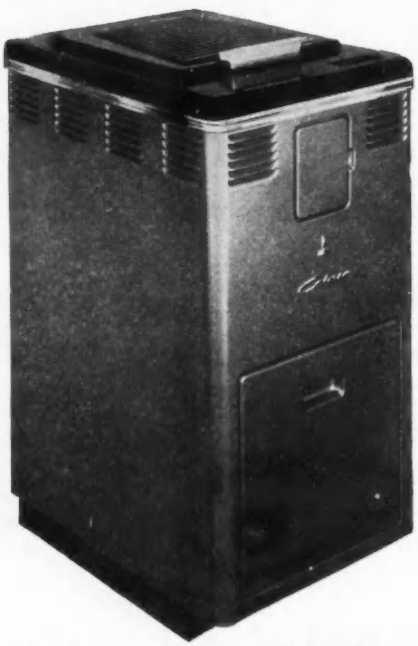

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Mr. R. ADAMS has been appointed General Manager of a newly created Engineering Division of Castrol Ltd. The Castrol Engineering Division has been formed to bring together and intensify the expanding engineering operations of the Group. These consist of the design, manufacture, installation and servicing of a very wide range of lubricating plant and equipment for both automotive and industrial applications. The new Division includes the following four Departments which are located at the Group's London headquarters, Castrol House:—

Lubrequipment (automotive lubricating equipment), the Manager of which is MR. J. J. BROOKMAN; Mechanical Appliances (industrial lubricating equipment), the Manager of which is MR. L. J. FIELD; Service, the Manager of which is MR. H. J. CHRISTMAS; and the Drawing Office, the Chief Draughtsman of which is MR. J. R. MOORES. Senior Buyer to the Division is MR. S. G. AVES and the Office Manager is MR. G. MEREDITH.

MR. F. O. HORSTMANN, formerly managing director and recently technical director of the Horstmann Gear Co. Ltd., has been appointed Chairman. MR. C. A. MANT, chairman since 1946, becomes Vice-Chairman. MR. F. A. WHEELER remains Secretary with a seat on the Board. MR. D. W. NICHOLDS, recently works manager, has been appointed to a seat on the Board as Works Director.

MR. RONALD G. HOOKER has been appointed Deputy Managing Director of K & L Steelfounders and Engineers Ltd., Letchworth, which is a member of the George Cohen 600 Group. Mr. Hooker, who is 39, in 1954 joined the Board of Brush Electrical Engineering Co. Ltd. as works director, being promoted to general manager in 1957.

MR. R. KENT has been appointed Deputy Chairman of George Kent Ltd., and MR. W. MAY has been appointed Assistant Managing Director. MR. J. G. VAUGHAN, has been appointed Managing Director of the Charterhouse Finance Corporation, as a Director of the Company.

MR. T. V. EMMERSON, has been appointed Deputy Chairman of Chamberlain Consolidated Ltd., the parent company of the Chamberlain Group of building, engineering and property companies.

MR. CHRISTOPHER CHATAWAY, M.P., Conservative Member for Lewisham North, has been appointed Parliamentary Private Secretary to the Minister of Power.

MR. K. H. PLATT has been appointed Secretary of the Institution of Mechanical Engineers in succession to MR. B. G. ROBBINS. The appointment takes effect from June 1.

PERSONAL NOTES

MR. S. A. TENNANT has retired from his position with the North Thames Gas Board as its local manager, Commercial District, after 47 years service in the gas industry. For many years Mr. Tennant was chief assistant sales manager with the Croydon Gas Company. He went to the Lea Bridge Company in 1935 as sales and service manager, moving in 1950 to a similar capacity with the North Middlesex Company. He went to the Commercial District as local manager in 1955.

MR. 'MONTY' LIPMAN has been appointed Home Sales Manager for Merton Engineering Co. Ltd., and will operate from Feltham. Mr. Lipman was formerly Southern area representative for Merton Loading Shovels and before joining Merton he was for several years London area representative for Frederick Parker Ltd.

MR. WILLIAM SCOTT has resigned from his position as manager of Newtownards (Co. Down) Urban Council gas undertaking in which he spent his entire career.

COUNCILLOR G. H. PARKS, M.B.E., of Brighton, Sussex, has been appointed Deputy Chairman of the South Eastern Gas Consultative Council in succession to MRS. H. S. MAIR.

MR. C. E. LOVELACE of Bearsted, near Maidstone, has been appointed a member of the South Eastern Gas Consultative Council.

COUNCILLOR E. C. WHEELER of Longlevens, Gloucester, has been appointed a member of the South Western Gas Consultative Council.

COUNCILLOR LT.-COL. LEWIS WILLIAMS, of Barmouth, Merioneth, has been appointed a member of the Wales Gas Consultative Council.

COMING EVENTS

February 21.—MIDLAND JUNIORS: Staff Mess Room, West Midlands Gas Board, Birmingham District, Council House, Birmingham. 'Industrial Gas Utilisation,' by Mr. Davies and Mr. Walker.

February 25.—MANCHESTER JUNIORS: Visit to Lancashire Tar Distillers, Cadishead. Dunlop Films, etc., or paper by member of their staff.

February 27.—NORTHERN G.C.C.: Northern Gas Board, 30, Grainger Street, Newcastle upon Tyne. 11.15 a.m.

MR. D. F. BLANE has been appointed Supervisor of Sales of Inland Natural Gas Co. Ltd., B.C., Canada. Mr. Blane began his career in the gas industry at Fenny Stratford, Buckinghamshire, with the sales and service section as his chief interest. In 1946 he accepted an appointment as assistant engineer and manager with the Freshwater Gas Co. Ltd., and became manager there after nationalisation. In 1957 he flew to Vancouver, British Columbia, to join the staff of Inland Natural Gas Co. Ltd.

MR. W. BRIGGS, director and manager of the Contracts and Sales Department of Erskine, Heap and Co. Ltd., has retired following a period of ill health. His period of service with the firm covered 51 years. MR. G. WEBB, who has been assistant manager for several years, takes over the position of Manager of this Department. Mr. Webb has been with the firm for nearly 13 years.

MR. S. N. TURNER, chairman of the Society of British Gas Industries in 1958-59 and since 1948 Deputy Managing Director of the Staveley Iron and Chemical Co. Ltd., will end his association with this company and its associated companies at the end of March. He will continue his other business activities.

MR. W. D. WILSON, Chairman and Managing Director of George Wilson Gas Meters Ltd., has been elected President of the Coventry and District Engineering Employers' Association for the current year. Mr. Wilson has served on the Committee of the Association since 1946.

MR. C. MCINNES has been appointed as Field Sales Engineer within the Industrial Products Division of the North British Rubber Company. Mr. McInnes will handle the field activities of conveyor belting in which product he has had considerable experience.

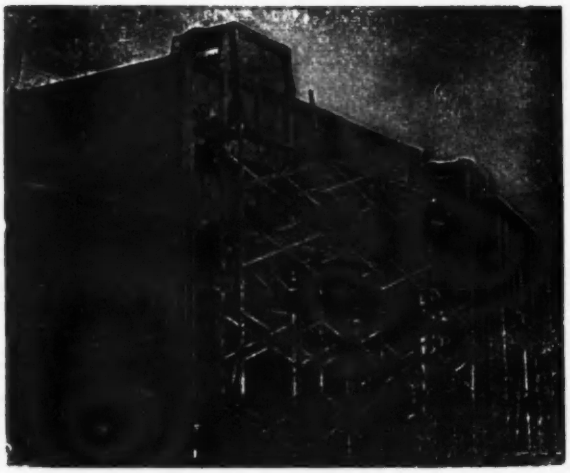
MR. J. A. DRAKE, Chairman and Managing Director of Drakes of Halifax Ltd., received the C.B.E., from Her Majesty Queen Elizabeth, the Queen Mother, at Buckingham Palace. The award was made by the Queen in the New Year's Honours List.

MR. P. K. MARLOW, assistant chief accountant to the North Thames Gas Board, has resigned. MR. L. A. W. SIMMONS has been appointed Deputy Chief Accountant, and MR. R. G. BLOOM, Assistant Chief Accountant.

MR. ALAN B. BRIGGS, who was trained at Leven gasworks, has been appointed District Manager at Fraserburgh. Prior to going to Fraserburgh, Mr. Briggs held appointments at Helensburgh, Buckie and Huntly.

MR. A. E. SMITH, of Tilehurst, Berkshire, has been re-appointed a part-time member of the Southern Gas Board.

Gunite



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